Factores Que Inciden En El Desempeño Seguro De Trabajadores En Espacios Confinados, Alturas Y Caliente

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Resumen ejecutivo

El presente estudio busca identificar los factores que inciden en el desempeño de trabajadores que realizan sus actividades en espacios confinados, alturas y en caliente dentro del sector metalmecánico. Esto, justificado por las altas tasas de accidentalidad y mortalidad asociadas a estas tres actividades. Para hacer la presente monografía se utilizó, como método de estudio, el sistema documental, en el que la recolección de los datos se realizó a través de una bibliometría; con lo anterior, se permite escoger los artículos alineados que complementan con el tema de estudio a partir de diferentes bases de datos regionales e internacionales.

Los resultados se clasificaron en las siguientes categorías: A, B y C. En la categoría A y B se determinó que hay una correlación positiva entre la seguridad ocupacional y la productividad, al igual que entre el clima organizacional y el desempeño; por otro lado, la cultura organizacional tiene una considerable influencia en la motivación en el desempeño laboral, esto sirvió para determinar la dependencia entre las variables de seguridad y de entornos seguros y de motivación. En la categoría C se pudieron reconocer diferentes factores clave que inciden en el desempeño de los trabajos en espacios confinados, en alturas y en caliente tales como: el uso de los equipos de protección personal, las inspecciones del área de trabajo, la obtención y funcionamiento según los permisos de trabajo, personal capacitado y supervisión constante. En este trabajo investigativo, se hace la recomendación de realizar estudios a futuro sobre los factores de riesgo enfocándolos en trabajos en caliente, ya que estos cuentan con poca información en comparación con otro tipo de labores, es importante que la valoración de los

factores sea tomada en cuenta y se sugiere los aquí encontrados porque estos se basan en información investigada y analizada sobre una empresa real, esto a su vez permite corroborar y medir.

Palabras clave: Desempeño laboral, factores de riesgo, trabajo en alturas, espacios confinados, trabajo en caliente.

Introducción

Los trabajos en caliente, alturas y espacios confinados, tradicionalmente han sido interpretados como actividades críticas dentro del sector de manufactura. El trabajo en caliente, es todo aquel que produce chispas, calor o flamas y puedan generar riesgo de incendio o de explosión. Por otra parte, el trabajo en alturas ha sido definido como todo aquel que lleve implícito un riesgo de caída, ya sea por suspensión o desplazamiento; este es categorizado de alto riesgo por la posibilidad de producir accidentes o incluso la muerte del trabajador. La organización internacional del trabajo OIT ha precisado que el trabajo confinado es toda actividad que se desarrolla en un espacio total o parcialmente cerrado y que genera inminente riesgo de incendio, explosión, asfixia o ahogamiento, indistintamente de las dimensiones del mismo. La realización de estas actividades, en los contextos de la industria de la manufactura, implica la revisión constante de las condiciones de seguridad (pericia del trabajador y elementos de protección) para la disminución del riesgo que tienen implícitas. La identificación y control de los riesgos en los trabajos que se desarrollan en caliente, alturas y espacios confinados, conlleva el diseño de

puestos de trabajo que les permita a los trabajadores tomar las medidas necesarias para la protección, la integridad propia y de sus compañeros de labor. En el presente trabajo, se mostrará los principales postulados que, desde la literatura, han tenido la fuerza para ser incorporados en el sector real.

Problema

1.1 Descripción del problema

Es necesario resaltar que, en la industria metalmecánica a nivel mundial, existe una gran diversidad de riesgos. Castillo (2011) identifica que, dentro de los principales se encuentran: los de índole física (contemplados como: ruido, iluminación y temperatura) químicos, psicosociales y ergonómicos. Meza (1998) interpreta que las consecuencias del accidente de trabajo generan sufrimiento ya sea físico o psicológico y un impacto en las finanzas de las organizaciones.

Con relación al análisis de causa-efecto de la seguridad laboral, la principal causa por la cual se presentan accidentes/incidentes de trabajo, en las empresas metalmecánicas, se debe a la falta de compromiso de los empleados con el uso de los elementos de protección personal; dado que la empresa, ha cumplido con su responsabilidad de suministrarlos. De acuerdo con las estadísticas entregadas por Bedoya (2015) el 87.5% de los trabajadores no utilizan los elementos de protección personal (EPP) necesarios, ni toman las debidas precauciones generando, además, actos inseguros.

En ese orden de ideas, Morelos (2013) evidenció que un 62,5% de los accidentes son generados por golpes sufridos en el trabajo, esto se debe especialmente al descuido de los trabajadores y a la mala ubicación de objetos en la planta. Acorde con las premisas presentadas por Sánchez (2005)

> La industria metalmecánica es una de las actividades económicas que muestra una evolución constante en sus modos de producción, entre las labores que se desarrollan en dicha actividad, se presentan una gran cantidad y diversidad de riesgos profesionales que repercuten a corto, mediano y largo plazo en la salud del trabajador. (p. 15-25).

Como afirman Pérez y otros (2007) la industria metalmecánica lleva a los trabajadores a exponerse a diferentes riesgos físicos, químicos, biológicos, psicosociales y ergonómicos que, si no se controlan a tiempo, pueden ocasionar accidentes y enfermedades laborales. Es relevante para las organizaciones, hacer una valoración de los puestos de trabajo donde confluyen elementos relacionados a la percepción de los trabajadores.

Para fortalecer el sistema de gestión de riesgos, se deben identificar, de forma minuciosa, los factores que inciden con el desarrollo seguro de las actividades; considerando la materialización de los riesgos asociados al trabajo en alturas, caliente y espacios confinados, de acuerdo con SURA, estos son los que generan mayores días de incapacidad, severidad y costos asistenciales, además del costo social que lleva implícito cada accidente para la empresa, el trabajador y su familia. Esto puede verse reflejado en las cifras de mortalidad del trabajo en alturas, sólo en el 2020 se registraron 57 fatalidades derivadas de esta actividad laboral, presentando una tasa de 6.4 muertes por cada

100.000 trabajadores; esta cifra ha ido en aumento por los riesgos en trabajo en alturas y la falta de medidas para evitarlo.

Con respecto al trabajo en espacios confinados, Guillén (2016) enuncia que alrededor de 200 muertes anuales se producen debido al área laboral de confinamiento, de los cuales el 60% de los fallecidos eran rescatadores potenciales que intentaban salvar a una víctima que había quedado inconsciente. Adicionalmente, la organización internacional del trabajo (OIT) expone que desde el año 2012 se hace ineludible que, para contribuir al desarrollo de la sociedad, la reducción de la pobreza, la promoción de la dignidad humana y la inclusión social, se debe responder a las necesidades de protección y generación de bienestar a los trabajadores; esto último con el fin de contribuir al desarrollo económico, ya que permite a las organizaciones mantener una fuerza de trabajo estable y adaptable. Lo anterior se logra mediante la medición constante de los diferentes factores que pueden impactar el desempeño en el puesto de trabajo.

Es importante clarificar que: estos convenios y recomendaciones son instrumentos que pretenden generar estándares o elementos mínimos, a tener en cuenta, en el desarrollo de la política pública relacionada con sistemas nacionales de salud y seguridad social; en todas las regiones del mundo, a cada país le corresponde desarrollar estas labores de seguridad dependiendo su contexto. Por su parte, Colombia ha incorporado a su normatividad varios de estos elementos que se contemplan en los diferentes convenios que establece la OIT. En la actualidad, hay mayor fundamento y campo de conocimiento sobre estos temas. La relación entre seguridad y salud en el trabajo, son de relevancia para la sociedad y para las organizaciones, es por esto que, actualmente

en Colombia, existe un observatorio para medir las estadísticas relacionadas con el tema. De acuerdo al CCS, durante el 2021, a nivel general, se presentaron 513.857 accidentes de trabajo[1], 42.646 enfermedades laborales[2] y 608 muertes relacionadas con el trabajo[3]. Si se revisan los datos por sectores económicos, se puede evidenciar, mediante la infografía del CCS, que los más críticos por las altas tasas de accidentalidad son: agricultura, ganadería, caza y silvicultura (13.75%), seguido por minas y canteras (13.75%), industria manufacturera (7.7%), construcción (7.1%) y finalmente el sector eléctrico, de gas y agua (5.56%). Todos estos son porcentajes altos a la cifra promedio de accidentalidad de Colombia que corresponde al 4.76%.

Al centrarse en la industria manufacturera, el tercer sector con mayor tasa de accidentalidad, se evidencia que durante el año 2021 un promedio de 7.7 empleados se accidentan por cada 100. Según Marrugo (2011):

> La metalmecánica es una de las actividades económicas que muestra la evolución constante en sus modos de producción, entre las labores que se desarrollan en dicha actividad se presentan una gran cantidad y diversidad de riesgos profesionales que repercuten a corto, mediano y largo plazo en la salud del trabajador. (p. 29).

[1] Tasa equivalente al 4.76%
[2] Tasa equivalente a 394.9 x 100mil.
[3] Tasa equivalente a 5.63 x 100mil.

De acuerdo a Fernández (2008) “es necesario estudiar los ámbitos laborales de manera más compleja y sistemática para comprender el porqué de un mayor o menor rendimiento” (p. 89). En concordancia con lo anterior, se retoma a Robbins (1998) quien afirma que “es relevante para la organización identificar factores que brinden a los empleados satisfacción para mejorar el desempeño” (p. 90). De igual forma, el autor sostiene que “para los empleados es importante sentir que su entorno laboral es seguro y cómodo para desempeñar sus labores diarias” (p.345).

Para el estudio en curso, se identificó que Marjalizo (2014) ya había realizado estimaciones pertinentes a los trabajadores que desarrollan sus actividades en espacios confinados, alturas o caliente y afirmó que:

> En estos lugares existen numerosos riesgos, como pueden ser los mecánicos y eléctricos por equipos que se ponen en marcha, atrapamientos, choques, golpes, caídas a distinto y al mismo nivel, caída de objetos, malas posturas, ambiente agresivo (calor, ruido, iluminación deficiente), mala comunicación con el exterior. (p.15).

Se puede aseverar que, trabajar es una de las actividades que mayor tiempo ocupa la vida de una persona en Colombia, con lo que es de suma relevancia identificar los factores que inciden en el desempeño laboral; esto puede mostrar a la organización la posibilidad de flexibilizar jornadas laborales y ámbitos de desempeño. En este punto cabe destacar dos factores notables como lo son: la reducción de costos y el aumento de rentabilidad. Diaz (2010) cita a McLean (1995) e identifica que, “en la mayor parte de los sectores de la economía, existe interés en evaluar aspectos

relacionados con la capacidad de usar, de manera diferencial, la maquinaria y el equipo para lograr eficiencia". (p. 179). En ese orden de ideas, es importante entender que, si bien es cierto que la maquinaria y el equipo se puede perpetuar dentro de la organización, es indispensable salvaguardar el conocimiento de sus trabajadores que son los que permiten desempeñar eficientemente las actividades que se realizan.

En Colombia, son pocos los trabajos empíricos que han explicado los factores que inciden en el desempeño seguro que los trabajadores del sector metalmecánico desarrollan en espacios confinados, calientes y alturas, sumando también la alta tasa de accidentalidad en el sector manufacturero. La presente monografía de grado, busca exponer qué factores inciden para el trabajo seguro en alturas, espacios confinados y trabajo en caliente se han tenido en cuenta en las investigaciones relacionadas al sector manufacturero, puntualizando lo abordado para actividades metalmecánicas.

1.2 Pregunta de investigación

¿Cuáles son los factores que inciden en el desempeño seguro de los trabajadores que realizan sus actividades en espacios confinados, calientes y alturas en las investigaciones recientes sobre el sector manufacturero, en especial las relacionadas con actividades metalmecánicas?

2.0. Objetivos

2.1 Objetivo general

- Determinar cuáles son los factores que inciden en el desempeño seguro de trabajadores que realizan sus actividades en espacios confinados, calientes y alturas dentro del sector manufacturero en especial las relacionadas a actividades de metalmecánica.

2.2 Objetivos específicos

- Explorar principales hallazgos de investigaciones que hayan abordado características para trabajo seguro en espacios confinados, alturas y calientes dentro de la industria manufacturera en especial las relacionadas con actividades metalmecánicas.

- Identificar dentro de la literatura los principales factores de riesgo, a los que se encuentran expuestos los trabajadores en espacios confinados, alturas y en caliente, por la forma en la que desarrollan sus actividades dentro del sector manufacturero en especial actividades metalmecánicas.

- Describir las concordancias entre los planteamientos de los diferentes autores sobre factores de desempeño seguro para trabajadores de espacios confinados, alturas y calientes en la industria manufacturera en especial las actividades metalmecánicas.

OBJETIVOS DE PROYECTO		ASPECTOS A CONSIDERAR PARA EL CUMPLIMIENTO	MEDIOS Y HERRAMIENTAS PARA LEVANTAR INFORMACIÓN
Determinar cuáles son los factores que inciden en el desempeño seguro de trabajadores que realizan sus actividades en espacios confinados, calientes y alturas dentro del sector manufacturero en especial las relacionadas a	Explorar principales hallazgos de investigaciones que hayan abordado características para trabajo seguro en espacios confinados, alturas y calientes dentro de la industria manufacturera en especial las relacionadas con actividades metalmecánicas	La probable cantidad y calidad de datos que se puedan obtener	Bases de datos Ecuaciones de búsqueda Matriz de Excel Análisis bibliométrico
	Identificar dentro de la literatura los principales factores de riesgo, a los que	Las características de las investigaciones que	Matriz de Excel Análisis bibliométrico

actividades de metalmecánica	se encuentran expuestos los trabajadores en espacios confinados, alturas y en caliente, por la forma en la que desarrollan sus actividades dentro del sector manufacturero en especial actividades metalmecánicas.	pueden recopilarse de forma viable	
	Describir las concordancias entre los planteamientos de los diferentes autores sobre factores de desempeño seguro para trabajadores de espacios confinados, alturas y calientes en la industria	El número total de investigaciones que se pueden recopilar, hablando en términos realistas	Vosviewer, Redes de coocurrencia Infogram, nube de palabras

	manufacturera en especial las actividades metalmecánicas		

3.0 Justificación

Identificar los factores que inciden en el desempeño laboral de una empresa es importante porque permite comprender las actitudes relacionadas con los trabajadores y su grado de satisfacción laboral dentro de los diferentes cargos ocupados. Para Perdomo (2002) “el estudio del comportamiento de los trabajadores, dentro de una organización, constituye uno de los quehaceres más relevantes ya que el aspecto humano es determinante para alcanzar los objetivos estratégicos de la organización” (p.39). En el mismo sentido Vygotsky (1978) planteó “la necesidad de los empresarios por mantener trabajadores felices, ya que eso es indispensable en el desarrollo adecuado de las tareas encomendadas” (p. 39).

Así mismo, se ha planteado por Uribe (2014) que “la indagación previa de los entornos de trabajo, que las empresas ofrecen a los trabajadores, puede incidir en los factores de desempeño” (p.37) y le permiten, en ese sentido, a la organización identificar elementos que contribuyan a la satisfacción en el puesto de trabajo, lo cual integra a la consecución de los objetivos estratégicos. Ramos (2012) también plantea “la necesidad de comprender los elementos que participan y la relación que guardan factores de desempeño dentro de la organización” (p. 87).

De acuerdo con la investigación desarrollada por Díaz (2017), se puede concluir que existe relación entre la seguridad en el trabajo y el desempeño laboral, porque permite que los colaboradores realicen el trabajo de mejor forma al establecer medidas de seguridad. “Esto hace que todo el personal se sienta seguro al momento de ejecutar sus tareas diarias y así evitar accidentes y enfermedades”. (p. 49).

La Organización Mundial de la Salud (OMS) planteó cuatro factores de influencia para el ámbito de trabajo: ambiente físico, ambiente psicosocial, recursos personales de salud en el trabajo y la participación de la empresa en la comunidad; se hace necesario particularizar qué factores influyen en trabajos que se llevan a cabo en espacios confinados, calientes y alturas para las empresas manufactureras que son las que mayor índice de accidentalidad presentan en el país, según las cifras de la cámara técnica de riesgos laborales de Facecolda, esto equivale a un 17% de todos los accidentes laborales presentados en los diferentes sectores económicos del país.

El desarrollo de esta investigación genera un impacto positivo en el ámbito de estudio de la seguridad ocupacional ya que, identificando los factores relacionados con los principales riesgos en trabajos calientes, alturas y confinados para el sector manufacturero, en especial con actividades metalmecánicas, es posible crear estrategias para mitigarlos y así mismo reducir las tasas de accidentalidad, mortalidad y de enfermedades soportadas en investigaciones desarrolladas previamente.

Se espera que las demás empresas del sector metalmecánico, o empresas que tengan dentro de su organigrama trabajos de alto riesgo, puedan verse beneficiados con los resultados de la presente investigación para facilitar los procesos de identificación de peligros en sus matrices de riesgo, de tal forma que puedan prevenir una gran variedad de estos y que quizás no hayan considerado como tal.

Se pretende alimentar la base datos de la Corporación Universitaria Minuto de Dios en temas de seguridad y salud en el trabajo, específicamente con la identificación de factores de riesgo que inciden en el desempeño seguro de los trabajos en espacios confinados, alturas y calientes, todas estas tareas de alto riesgo; a fin de que pueda servir como referente para futuros especialistas en la materia y profesionales de salud ocupacional en sus investigaciones y con esto ampliar el campo de conocimiento existente.

Este proyecto, les permite a las autoras aplicar sus conocimientos sobre salud ocupacional en un entorno empresarial, solucionando problemas reales, más allá de los que se pueden plantar en la academia, apoyando su crecimiento profesional; también sirve para fortalecer su experiencia sobre las tareas de alto riesgo, aquí estudiadas, con aplicación a múltiples industrias.

4.0 Marco de referencial

Para esta investigación, se toman como referencia a los teóricos que han tratado el tema de seguridad laboral y salud en el trabajo. Esta mecánica permite entender la problemática referente a accidentalidad y mortalidad en el marco de acción de los empleados del sector manufacturero en especial los que realizan actividades relacionadas con la metalmecánica en espacios confinados, calientes y alturas. De igual manera, estas teorías abren un parámetro de estudio que permite evidenciar algunos fenómenos de seguridad y darle un sentido que sobrepase los lineamientos académicos, es decir, de presentar una postura crítica frente a las dinámicas que emplean, tanto empresa como empleados, en materia de seguridad y el cumplimento de esta.

4.1 Marco teórico

Para desarrollar esta investigación, se toma como referente los conceptos teóricos de seguridad laboral y con este los subtemas en torno al mismo, es decir, desde el área psicosocial, económica, organizacional y sus repercusiones culturales.

Presentado con anterioridad, es importante destacar que el investigador base es Elías Alberto Bedoya, ya que desde sus investigaciones se explica el fenómeno de la accidentalidad laboral como una prioridad que debe ser tomada en cuenta, estar en las agendas de empleados y sobre todo, tener un fundamento en el que se eduque y apliquen estos protocolos; ya que su resultado es la efectividad laboral, entornos seguros y empleados en condiciones de trabajo que garanticen su protección, pero también su responsabilidad con las normativas. De igual forma, se tiene en consideración a Axiprex (2021) que evidencia como la seguridad y salud en el trabajo es un elemento imprescindible para que los trabajadores se sientan satisfechos y motivados y por lo tanto que sean productivos y rentables para las organizaciones. En ese orden de ideas Axiprex (2021) ha recalcado que:

> Para las organizaciones es importante tener implementado el Sistema de gestión de seguridad y salud en el trabajo ya que le permite aumentar su productividad y rentabilidad, disminuir el ausentismo laboral, mejora no sólo la salud, sino también el bienestar y satisfacción de los trabajadores, se fomentan los vínculos y la fidelidad entre el trabajador y su empresa, evitando la rotación y reteniendo los profesionales con mayor talento, además, se mejora el clima laboral, la motivación y la participación. Galindo, (02 diciembre 2021). *La importancia de la seguridad y salud en el trabajo.* Aspirex. https://asiprex.com/la-importancia-de-la-seguridad-y-salud-en-el-trabajo/

Esto se materializa porque se satisface la necesidad de seguridad del trabajador. Frederick Herzberg habría demostrado la importancia del trabajo seguro en el desarrollo de la teoría de los dos factores.

Al ser esta monografía de carácter crítico, se hace necesario retomar a Benítez (2021) para explicar y definir qué son los trabajos en altura y los trabajos en espacios confinados. Los trabajos en altura son todas aquellas acciones laborales que se realizan a dos metros sobre el nivel del suelo y que puede presentar un riesgo de caída. Esto conlleva implícito el uso de maquinaria y equipo que se destina para la elevación y/o movimiento de las personas, usualmente dentro de las maniobras se identifican escaleras, andamios, plataformas, entre otros que deben estar debidamente certificadas para el trabajo. En esta investigación se entiende como trabajo en alturas todo aquel que sea desarrolla a más de 1.50 metros de altura.

Por otra parte, el mismo autor también ha desarrollado el concepto de trabajo confinado como aquella actividad que desempeña un trabajador en un espacio con abertura limitada, el cual carece de la ventilación e iluminación natural favorable, esto conlleva a que los trabajadores se vean expuestos a contaminantes tóxicos y a tener menos concentración de oxígeno en su puesto de trabajo.

Es relevante evidenciar por qué el trabajo en espacios confinados, alturas y caliente es considerado actividad de alto riesgo, de acuerdo con el Ministerio de Salud (2003): “porque su naturaleza o lugar de desempeño, tiene implícito la exposición intensa a situaciones que potencialmente pueden causar accidentes laborales severos y en muchas ocasiones, mortales”. Para

el trabajo en curso se comprende que estos trabajos no son excluyentes entre sí, es decir, pueden confluir dos o las tres condiciones en una misma área laboral.

De acuerdo con los que expone Buenaño (2017):

> Las actividades de alto riesgo requieren de un cuidado especial y de un procedimiento de trabajo seguro, los trabajadores que tienen esas tareas tienen un riesgo mucho más alto, que los que desarrollan sus actividades en otro oficio, y permanentemente están expuestos a factores técnicos atmosféricos, a factores psicosociales a problemas de la salud física y mental entre otras problemáticas. (p. 38).

Entendiendo las razones para clasificar una tarea como de alto riesgo, resulta pertinente indicar las consideraciones específicas de cada actividad.

En cuanto al trabajo en alturas, se define como "cualquier actividad o desplazamiento que realice un trabajador mientras esté expuesto a un riesgo de caída de distinto nivel, cuya diferencia de cota sea aproximadamente igual o mayor a 1.5 metros con respecto del plano horizontal inferior más próximo". Escuela Colombiana de Ingeniería (2009). De acuerdo con Gracia (2019) "es considerado como trabajo de alto riesgo debido a que, en las estadísticas nacionales, es una de las primeras causas de accidentalidad y de muerte en el trabajo".

Con respecto al trabajo en espacios confinados la NIOSH define un *espacio confinado* como un lugar que, por su diseño, "tiene un número limitado de aberturas de entrada y salida, cuenta con una ventilación natural desfavorable que podría contener o generar peligrosos contaminantes del aire, y no está destinado para una presencia continua de empleados". CDC (2017). En relación con esto, Buenaño (2017) indica que:

Los espacios confinados son, en sí mismos, desfavorables para la realización de cualquier actividad y en ellos, no solo se configuran riesgos relacionados a espacio y la calidad de aire, sino que, dependiendo de la actividad económica, se pueden reunir gran cantidad de peligros y riesgos ya que pueden acumularse contaminantes tóxicos, inflamables y falta de oxígeno.

Por último, el CCS establece que los trabajos en caliente son aquellas actividades como soldadura, oxicorte, esmerilado, taladrado, entre otros, que involucra la generación de calor, chispas, llamas u otro tipo de fuentes de ignición, capaces de causar incendios o explosiones ante la presencia de atmósferas explosivas. “La criticidad de esta tarea se da en razón a que los incendios originados, a partir de trabajos en caliente, generan muertes, lesiones y pérdidas de propiedades por cientos de millones de dólares cada año que podrían evitarse”. NFPA (2021).

4.2 Marco legal

Es necesario revisar el contexto legal sobre el cual se fundamenta este proyecto de investigación, identificar la normativa nacional e internacional existente para comprender, de forma más acertada, todos los requerimientos en términos de salud ocupacional para desarrollar tareas de alto riesgo, específicamente sobre las presentadas en este documento, a fin de determinar tanto el grado de cumplimiento normativo por parte de la empresa CSIP SAS, como aquellas acciones que no se estén llevando a cabo, de ser el caso, y que pueden conducir a la prevalencia de peligros y riesgos en el entorno.

Por todo lo anterior, se presenta la tabla 1, en la cual se consolidan las normas relativas a seguridad laboral y salud ocupacional, posteriormente trabajo en alturas, trabajo en espacios confinados y trabajos en caliente, cada una de estas secciones incluye la norma y su año de emisión, la disposición que regula, su estado actual (activa o derogada), y el artículo o contenido que aporta a la presente investigación.

Tabla 1

Seguridad laboral y salud ocupacional.

Norma	***Disposición***	***artículo, contenido y aporte***
Resolución 2646 de 2008	Se establecen disposiciones y se definen responsabilidades para la identificación, evaluación, prevención, intervención y monitoreo permanente de la exposición a factores de riesgo psicosocial en el trabajo.	CAPÍTULO II: Identificación y evaluación de los factores psicosociales en el trabajo y sus efectos: ● ART 5. Factores psicosociales. ● ART 6. Factores psicosociales intralaborales que deben evaluar los empleadores. ● ART 7. Factores psicosociales extralaborales que deben evaluar los empleadores. ● ART 8. Factores psicosociales individuales que deben ser identificados y evaluados por el empleador. ● ART 9. Evaluación de los efectos de los factores psicosociales. CAPÍTULO III: Intervención de los factores psicosociales en el trabajo y sus efectos: ● ART 13. Criterios para la intervención de los factores psicosociales.
Decreto 1072 de 2015	Decreto Único Reglamentario del Sector	Libro 2, Parte 2, Riesgos laborales, capítulo 6 “SISTEMA DE GESTIÓN DE LA SEGURIDAD Y SALUD EN EL TRABAJO”

Trabajo.	● ART 2.2.4.6.8. Obligaciones de los empleadores. El empleador está obligado a la protección de la seguridad y la salud de los trabajadores, acorde con lo establecido en la normatividad vigente. 5. Cumplimiento de los Requisitos Normativos Aplicables: Debe garantizar que opera bajo el cumplimiento de la normatividad nacional vigente aplicable en materia de seguridad y salud en el trabajo. 6. Gestión de los Peligros y Riesgos: Debe adoptar disposiciones efectivas para desarrollar las medidas de identificación de peligros, evaluación y valoración de los riesgos y establecimiento de controles que prevengan daños en la salud de los trabajadores y/o contratistas, en los equipos e instalaciones. 8. Prevención y Promoción de Riesgos Laborales: El empleador debe implementar y desarrollar actividades de prevención de accidentes de trabajo y enfermedades laborales, así como de promoción de la salud en el Sistema de Gestión de la Seguridad y Salud en el Trabajo (SG-SST), de conformidad con la normatividad vigente. ● ART 2.2.4.6.10. Responsabilidades de los trabajadores. 1. Procurar el cuidado integral de su salud; 2. Suministrar información clara, veraz y completa sobre su estado de salud; 3. Cumplir las normas, reglamentos e instrucciones del Sistema de Gestión de la Seguridad y Salud en el Trabajo de la empresa 4. Informar oportunamente al empleador o contratante

acerca de los peligros y riesgos latentes en su sitio de trabajo;

5. Participar en las actividades de capacitación en seguridad y salud en el trabajo definido en el plan de capacitación del SG-SST; y
6. Participar y contribuir al cumplimiento de los objetivos del Sistema de Gestión de la Seguridad y Salud en el Trabajo SG-SST.

- ART 2.2.4.6.12. Documentación. El empleador debe mantener disponibles y debidamente actualizados entre otros, los siguientes documentos en relación con el Sistema de Gestión de la Seguridad y Salud en el Trabajo SG-SST:

  3. La identificación anual de peligros y evaluación y valoración de los riesgos;

  4. El informe de las condiciones de salud, junto con el perfil sociodemográfico de la población trabajadora y según los lineamientos de los programas de vigilancia epidemiológica en concordancia con los riesgos existentes en la organización;

  11. Los reportes y las investigaciones de los incidentes, accidentes de trabajo y enfermedades laborales de acuerdo con la normatividad vigente;

  16. Evidencias de las gestiones adelantadas para el control de los riesgos prioritarios.

- ART 2.2.4.6.23. Gestión de los peligros y riesgos. El empleador o contratante debe adoptar métodos para la identificación, prevención, evaluación, valoración y control de los peligros y riesgos en la empresa.

		● ART 2.2.4.6.32. Investigación de incidentes, accidentes de trabajo y enfermedades laborales. La investigación de las causas de los incidentes, accidentes de trabajo y enfermedades laborales, debe adelantarse acorde con lo establecido en el presente Decreto. 1. Identificar y documentar las deficiencias del (SG-SST) lo cual debe ser el soporte para la implementación de las acciones preventivas, correctivas y de mejora necesarias; 2. Informar de sus resultados a los trabajadores directamente relacionados con sus causas o con sus controles, para que participen activamente en el desarrollo de las acciones preventivas, correctivas y de mejora; 3. Informar a la alta dirección sobre el ausentismo laboral por incidentes, accidentes de trabajo y enfermedades laborales; y alimentar el proceso de revisión que haga la alta dirección de la gestión en seguridad y salud en el trabajo y que se consideren también en las acciones de mejora continua.
TRABAJO EN ALTURAS		
Resolución 2400 de 1979	Disposiciones sobre vivienda, higiene y seguridad en los establecimientos de trabajo.	ART 188. Para aquellos trabajos que se realicen a ciertas alturas en los cuales el riesgo de caída libre no pueda ser efectivamente controlado por los medios estructurales tales como barandas o guardas, los trabajadores usarán cinturones de seguridad o arneses de seguridad, con sus respectivas cuerdas o cables de suspensión, estarán firmemente atados al cinturón o arnés de seguridad y

		también a la estructura del edificio, torre o, poste u otra edificación donde se realice el trabajo. (Resistencia de rotura no menor de 1.150 Kg y el ancho de los cinturones no será menor de 12 cm, con espesor de 6 mm) ART 191. Todos los cinturones, arneses, herrajes y fijaciones serán examinados a intervalos frecuentes y aquellas partes defectuosas serán reemplazadas. CAPÍTULO III. De los andamios y escaleras. Del artículo 628 al 632 sobre las características, dimensiones y requerimientos de los andamios. ART 633. Los trabajadores están en la obligación de revisar los andamios que utilicen en su trabajo, para cerciorarse que se encuentren en buenas condiciones y aptos para realizar el trabajo. Deberán caminar cuidadosamente por los andamios y usar el cinturón de seguridad en cuanto sea posible, o sujetarse mediante cuerdas para operar en forma segura. En caso de mal funcionamiento de andamios, escaleras, etc., el trabajador deberá informar a su jefe inmediato para que se tomen las medidas del caso.
Real decreto 2177/2004	Se establecen las disposiciones mínimas de seguridad y salud para la utilización por los trabajadores de los equipos de	ARTÍCULO ÚNICO. El apartado 1.6 del anexo I, «Disposiciones mínimas aplicables a los equipos de trabajo» Si fuera necesario para la seguridad o salud de los trabajadores, los equipos de trabajo y sus elementos deberán estar estabilizados por fijación o por otros medios. Los equipos de trabajo cuya utilización prevista

	trabajo, en materia de trabajos temporales en altura.	requiera que los trabajadores se sitúen sobre ellos deberán disponer de los medios adecuados para garantizar que el acceso y permanencia en esos equipos no suponga un riesgo para su seguridad y salud. Las escaleras de mano, los andamios y los sistemas utilizados en las técnicas de acceso y posicionamiento mediante cuerdas deberán tener resistencia y los elementos necesarios de apoyo o sujeción, o ambos, para que su utilización en las condiciones para las que han sido diseñados no suponga un riesgo de caída por rotura o desplazamiento. ANEXO 4 4.3 Disposiciones específicas relativas a la utilización de andamios, del 4.3.1 al 4.3.7.
Resolución 4272 de 2021	Se establecen los requisitos mínimos de seguridad para el desarrollo de trabajo en alturas.	Toda la norma es importante como fuente de información para esta investigación, pues fundamenta el programa de prevención y protección contra caídas de alturas en su título II, y los procesos de capacitación, entrenamiento y gestión de los centros de entrenamiento en el título III.
TRABAJO EN ESPACIOS CONFINADOS		
OSHA 29 CFR 1910.146	Requisitos para prácticas y procedimientos para proteger a los empleados en la industria general de los	1910.146 App A - Diagrama de flujo de decisión de espacio confinado requerido por permiso 1910.146 App B - Procedimientos para pruebas atmosféricas. Se deben evaluar los peligros del espacio que requiere permiso y verificación de que existen condiciones de entrada aceptables para ingresar.

	peligros de la entrada a espacios confinados que requieren permiso.	1910.146 App C - Ejemplos de programas de espacio confinado requeridos por permiso ● Sumersión ● Presencia de gases tóxicos. Igual o superior a 10 ppm de sulfuro de hidrógeno medido como un promedio ponderado de 8 horas. ● Presencia de gases explosivos/inflamables. Igual o superior al 10% del límite inferior de inflamabilidad (LFL). ● Deficiencia de oxígeno. Concentración de oxígeno en la atmósfera igual o inferior al 19.5% en volumen. 1910.146 App D - Lista de verificación previa a la entrada en espacios confinados.
Resolución 0491 de 2020	Se establecen los requisitos mínimos de seguridad para el desarrollo de trabajos en espacios confinados.	Toda la resolución se dispone a fin de controlar uno de los principales peligros del trabajo en sitios confinados, correspondiente a las atmósferas inadecuadas para su respiración, con lo que se puede destacar el título II. Programa de gestión para el trabajo en espacios confinados, que apoya con medidas de prevención y controles administrativos, medidas de protección, y requerimientos de formación para mitigar los riesgos asociados al trabajo en espacios confinados.
TRABAJOS EN CALIENTE		
Ley 9 de 1979	Por la cual se dictan Medidas sanitarias	ART 108. En los lugares de trabajo donde existan condiciones o métodos que puedan afectar la salud de los trabajadores por frío o calor, deberán adoptarse todas las medidas necesarias para controlar y mantener los factores de intercambio calórico entre el ambiente y el

		organismo del trabajador, dentro de límites que establezca la reglamentación de la presente Ley. ART 113. Las calderas, cilindros para gases comprimidos y otros recipientes sometidos a presión, sus accesorios y aditamentos deberán ser diseñados, construidos y operados de acuerdo con las normas y regulaciones técnicas y de seguridad que establezcan las autoridades competentes. ART 114. En todo lugar de trabajo deberá disponerse de personal adiestrado, métodos, equipos y materiales adecuados y suficientes para la prevención y extinción de incendios.
Resolución 2400 de 1979	Disposiciones sobre vivienda, higiene y seguridad en los establecimientos de trabajo.	ART 63. La temperatura y el grado de humedad del ambiente en los locales cerrados de trabajo, será mantenido, siempre que lo permita la índole de la industria, entre los límites tales que no resulte desagradable o perjudicial para la salud. PARÁGRAFO. Cuando existan en los lugares de trabajo fuentes de calor, como cuerpos incandescentes, hornos de altas temperaturas, deberán adaptarse dispositivos adecuados para la reflexión y aislamiento del calor, y los trabajadores deberán utilizar los elementos de protección adecuados, contra las radiaciones dañinas de cualquier fuente de calor.

Fuente: Elaboración de las autoras con base a las fuentes consultadas.

5.0 Metodología

Dentro de esta línea de investigación se toma como fuente de información los artículos y estudios relacionados al tema, esto como una base argumental y sustentable de esos factores que inciden en el desempeño laboral. Esta monografía, de compilación, realiza una presentación crítica y personal de la bibliografía recabada al respecto y expone una opinión propia de la temática y de la información.

5.1 Enfoque y alcance de la investigación

La presente investigación se desarrolla como una monografía, que se clasifica como tipo de investigación documental, la cual consiste en el análisis de la información escrita sobre un determinado tema, con el propósito de establecer relaciones, diferencias, etapas, posturas o estado actual del conocimiento respecto al tema objeto de estudio.

En este caso, el tema de estudio corresponde a identificar los factores de riesgo existentes en el sector metalmecánico para los trabajadores que desempeñan funciones de trabajo en alturas, espacios confinados y trabajo en caliente. Así como los indicadores mínimos de seguridad y salud en el trabajo de empresas que requieran desempeñar las tareas de alto riesgo previamente descritas, esto a fin de entender, a partir de valores de accidentalidad, mortalidad, severidad, frecuencia y enfermedad, por qué estas tareas se consideran de alto riesgo. Recopilando la información de investigaciones aplicadas en las empresas nacionales e internacionales, para considerar la mayor cantidad de factores de riesgo presentes en las organizaciones actualmente.

5.2 Descripción de la estrategia de búsqueda

Teniendo en cuenta que el buen desarrollo de esta investigación depende de la información encontrada sobre los factores de riesgo de los trabajos objeto de estudio. Se hace una revisión bibliográfica exhaustiva para consolidar los hallazgos de diferentes autores en torno al tema de investigación. Y para ello se comienza con la identificación de los términos asociados MESH o palabras clave, para esto se hizo una búsqueda en Tesauro de la UNESCO y en Tesauro ERIC, donde se encontraron el siguiente grupo de palabras:

- Inglés: health and safety, job safety, occupational health, occupational safety, occupational safety and health, safety measures, work environment, occupational diseases, accidents.

- Español: seguridad profesional, seguridad industrial, seguridad laboral, seguridad en el trabajo, enfermedad profesional.

A continuación, se construye la ecuación de búsqueda considerando tanto los términos encontrados y listados anteriormente, que sirven para centrar la búsqueda al campo de conocimiento de la seguridad y salud en el trabajo, como las palabras clave relacionadas con accidentalidad, enfermedad y mortalidad. Además de los términos que dan el enfoque a la tipología de las actividades estudiadas *altura, confinado, caliente* que en inglés corresponden a *work at heights, confined spaces y hot work.* De tal forma que, incluyendo los operadores booleanos y

teniendo en cuenta que las bases de datos a utilizar son internacionales y regionales, se establecen las siguientes ecuaciones de búsqueda en español e inglés:

(seguridad profesional OR seguridad industrial OR seguridad laboral OR seguridad en el trabajo OR seguridad y salud OR salud ocupacional) AND (facto* de riesgo OR peligr* OR accident* OR muert* OR morta* OR sever*) AND (altur* OR confinad* OR calient*).

(facto* de riesgo OR peligr* OR accident* OR muert* OR morta* OR sever*) AND (altur* OR confinad* OR calient*)

(Health and safety OR job Safety OR occupational health OR Occupational Safety and Health OR occupational safety OR occupational diseases) AND (danger* OR risk factor* OR accident* OR Disease* OR death* OR mortal*) AND (work* OR job*) AND (height* OR confined* OR hot)

(danger* OR risk factor*) AND (work* OR job*) AND (height* OR confined* OR hot) AND (accident* OR Disease* OR death* OR mortal*)

Como la información que se va a analizar es estructurada, entonces se escogen las bases de datos de artículos, tesis, monografías, etc. a las que las autoras tienen acceso y así poder descargar la información a utilizar, como se pueden observar en la tabla 2.

Tabla 2

Bases de datos utilizadas para la búsqueda de información.

	Nomenclatura	Base de datos	Procedencia
1		ScienceDirect	Internacional
2		ProQuest	Internacional
3		Dialnet	Regional
4		Redalyc.org	Regional

Fuente: Elaboración propia a partir de la búsqueda.

Al buscar en las bibliotecas se aplica un filtro de fecha, para que, en los resultados, se obtengan artículos publicados posterior al 2017, y de no contar con suficientes resultados se deberá ampliar este período de tiempo desde el 2015, por otro lado, aprovechando las clasificaciones que ofrecen las bases de datos, también se debe filtrar por libre acceso, dado que no vale la pena descargar múltiples artículos que no se podrán revisar; siempre y cuando la base de datos ofrezca esta opción.

5.2 Instrumentos

Para la recolección de la información a analizar, además de usar los repositorios descritos en el apartado anterior como herramienta para obtener los artículos, tesis y demás, también se construye una base de datos en una hoja de cálculo de Excel, donde se registraron los documentos encontrados. Este proceso se realiza con el fin de encontrar los documentos más relevantes y relacionados con la presente investigación, para esto, la matriz de Excel considera las siguientes variables: titulo, autores, resumen, título de publicación, año de publicación, base de datos, temas clave, y observaciones sobre los artículos analizados.

5.3 Procedimientos

Para realizar la depuración de la información y determinar el conjunto de artículos pertinentes para la identificación de los factores de riesgo de trabajos en alturas, espacios confinados, y trabajos en caliente, se sigue el procedimiento usado por Laserda (2012) para seleccionar los artículos que componen el portafolio de investigación, donde se postulan tres estrategias: análisis bibliométrico de artículos seleccionados, análisis bibliométrico de referencias bibliográficas de artículos seleccionados, e identificación de artículos de alta relevancia académica en la muestra.

El primer criterio para depurar la muestra inicial es eliminar los duplicados, puesto que la búsqueda se hace en diferentes bases de datos, para esto se descarga título, autores, revista y año de publicación de las bases de datos por cada artículo en formato xls o txt. A partir de un conjunto de filtros se deben eliminar todos los artículos duplicados con lo que se inicia el proceso de investigación con el número de artículos, noticias, etc. que se presentan en la tabla 3; estos se encontraron con la ecuación de búsqueda definida para cada base de datos.

Tabla 3.

Artículos iniciales obtenidos por base de datos.

Nomenclatura	Base de datos	Artículos iniciales
1	ScienceDirect	197
2	ProQuest	324
3	Dialnet	40
4	Redalyc.org	375

TOTAL	***936***

Fuente: Elaboración propia.

A continuación, se revisa que tan relacionado está el título del artículo con la investigación, y de esta forma se eliminan los que no están alineados, de acuerdo con este procedimiento quedan 75 artículos cuyo título está relacionado a la investigación.

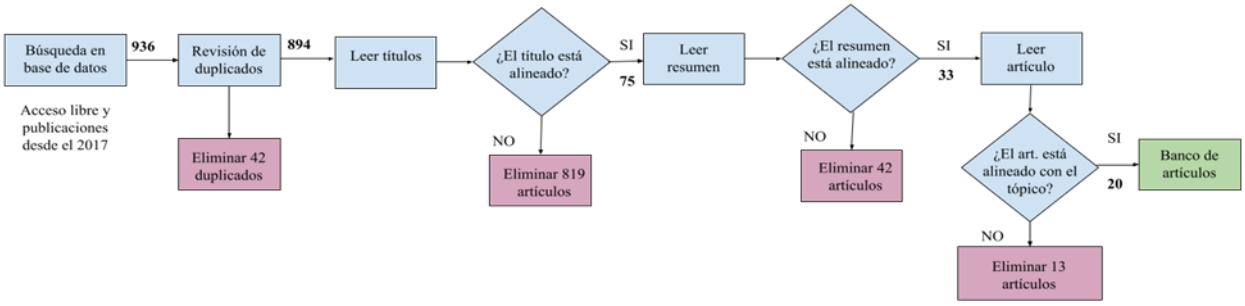
El siguiente criterio para determinar qué artículos compondrán el portafolio final tiene que ver con la revisión del resumen de los artículos, en este paso fueron seleccionados 33 artículos y se eliminaron 42.

Después se leyeron los documentos en su totalidad, para de nuevo determinar si están o no alineados con la investigación, en caso de no estarlo se eliminaron y en caso de estarlo se registraron en la base de datos del portafolio final, el cual termino con un número total de 20 artículos. Se utilizaron hojas de cálculo de Excel para analizar la información recolectada, a través de la herramienta de filtro.

El proceso de depuración previamente descrito se representa detalladamente en la figura 1.

Figura 1

Diagrama de flujo del proceso de depuración de los artículos.



5.4 Análisis de información.

La información se analizó por medio del software *Vosviewer* para el caso de los datos cualitativos, como lo son los factores de riesgo mencionados en las diferentes investigaciones analizadas. Por medio de este software, se pueden revisar redes entre la coocurrencia de términos, y mapas de densidad; también se usó *Infogram* para diagramar nubes de palabras, estos gráficos permiten identificar las tendencias o frecuencia del factor mencionado en la literatura y así mismo determinar su importancia en la materia de estudio.

5.5 Consideraciones éticas.

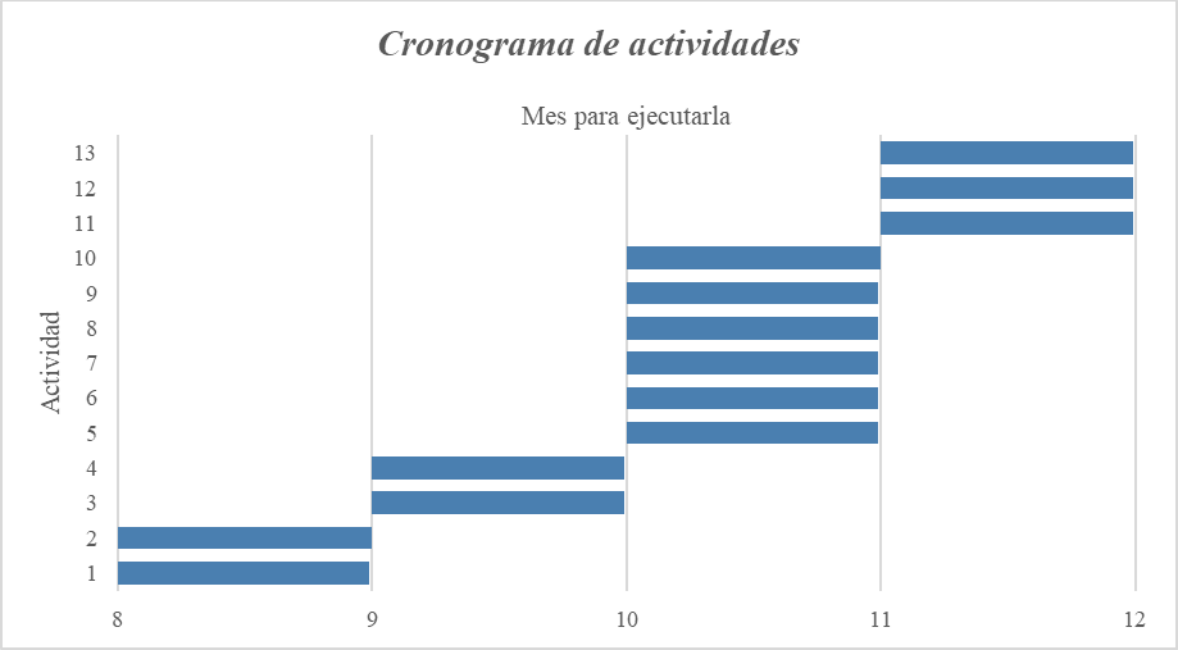
Considerando que el presente documento es una monografía, y los resultados o hallazgos se dan a partir de la recolección y análisis de información secundaria, es de vital importancia resguardar la propiedad intelectual, citando a cada autor que representó un aporte para la construcción del presente documento. Es de aclarar que como no se utilizan fuentes primarias, no se hacen

entrevistas ni encuestas a personas u organizaciones, entonces no se realizan autorizaciones o permisos para el tratamiento de datos o publicación de la investigación.

6.0 Cronograma

Figura 2

Diagrama de Gantt de la elaboración de la monografía.



Fuente: Elaboración de las autoras. Esquema de trabajo.

Tabla 4

Cronograma de entregables.

No.	Actividad	Tiempo (meses)		Producto
		Desde	**Hasta**	
1	Búsqueda de información	Agosto	Agosto	Base de datos de literatura
2	Análisis y selección de la información encontrada	Agosto	Septiembre	Portafolio final de documentos
3	Revisión de literatura	Septiembre	Octubre	Matriz de artículos
4	Descripción de los hallazgos encontrados en la literatura	Octubre	Octubre	Sección de la monografía: resultados y discusión
5	Desarrollar las conclusiones de la investigación	Octubre	Octubre	Sección de la monografía: conclusiones
6	Elaboración de recomendaciones sobre próximas investigaciones	Octubre	Noviembre	Sección de la monografía: Recomendaciones
7	Ajustes por observaciones	Noviembre	Noviembre	Consolidación de la monografía
8	Presentación del documento	Noviembre	Noviembre	
9	Revisión y aprobación	Noviembre	Noviembre	

10	Ajustes requeridos por jurados	Noviembre	Noviembre	Presentación documento de producción académica
11	Revisión final	Noviembre	Diciembre	
12	Aprobación del documento	Diciembre	Diciembre	
13	Emisión de certificado de aprobación para publicación	Diciembre	Diciembre	

Fuente: Elaboración de las autoras.

La responsabilidad de los entregables detallados recae en el equipo de trabajo Daniela Carrasco e Ivonne Castro.

7.0 Presupuesto

Es un trabajo desarrollado con recursos propios, por lo tanto, se establecen los siguientes costos y gastos necesarios para su ejecución:

Tabla 5

Presupuesto para el desarrollo de la investigación.

Ítem	Cantidad	Valor Total	Responsable
Internet horas	200	100.000	Carrasco y Castro
Minutos llamadas locales	50	10.000	Carrasco y Castro
Minutos llamadas internacionales	10	10.000	Carrasco y Castro
Computadores	2	500.000	Carrasco y Castro
Acceso a bases de datos	10	200.000	Carrasco y Castro

Desplazamientos	10	500.000	Carrasco y Castro
Reuniones	5	250.000	Carrasco y Castro
Horas hombre	400	20.000.000	Carrasco y Castro
TOTAL		**$21´570.000**	

Fuente: Elaboración de las autoras.

8.0 Resultados y discusión

Para esta investigación se encontraron un total de diecinueve autores teóricos, cuyos fundamentos apoyan la argumentación de este proyecto y así enfatizarlo con la empresa en estudio. De igual forma, se usaron las estadísticas de organizaciones que ayudan a entender el impacto de la seguridad laboral empleando, por su puesto, en el área de la metalmecánica.

A Continuación, se agruparán estas teorías en las categorías A y B, para efectos de que este documento sea preciso y adecuado en la aplicación de estas a la investigación en curso.

Con respecto a los factores determinantes para el desempeño seguro de trabajadores en alturas, espacios confinados y en caliente que se encontraron en la revisión de literatura, se presenta en la categoría C.

Categoría A: Artículos, tesis y libros.

En esta categoría se agrupan las teorías encontradas en tesis, artículos indexados, libros etc.

Dentro de la investigación realizada, se encuentra que autores como Elías Alberto Bedoya con sus artículos "Comportamiento de la accidentalidad en una empresa metalmecánica en Cartagena, Colombia" y "Accidentalidad en trabajadores del sector metalmecánico"; Sol Castillo y Teresa Torres López con su artículo titulado: "Percepción de riesgos laborales en trabajadores de industrias metalmecánicas" y José Morelos Gómez y Tomás Fontalvo Herrera con su artículo Caracterización y análisis del riesgo laboral en la pequeña y mediana industria metalmecánica en Cartagena". Trazan un paralelismo importante para entender las visiones de riesgo que asumen las empresas y los empleadores a la hora de enfrentar situaciones peligrosas. En estos dos artículos se fundamentan las dinámicas de los actores en estudios, es decir la empresa y los empleadores. Es de suma importancia tomarlos en cuenta, ya que esto permite considerar el concepto de accidentalidad laboral como algo que va más allá de su idea base, es decir, entender las disposiciones y mecanismos que se emplean en el efecto de acción/reacción.

Como parte del engranaje, para una mejor comprensión de este tema en diferentes aspectos, se toma la tesis doctoral de Marian Japen Díaz titulada "Predicción del rendimiento laboral a partir de indicadores de motivación, personalidad y percepción de factores psicosociales"; cuyo objetivo fue estudiar la relación entre los diferentes elementos que proveen motivación en un puesto de trabajo para mayor rendimiento, se evidenció cómo los trabajadores necesitan sentirse seguros en sus puestos de trabajo y cómo esto juega en el rendimiento del trabajador. El trabajo fue de alcance descriptivo con un enfoque correlacional, Diaz afirma la hipótesis que, a mayor

motivación, mayor rendimiento y dentro de los factores a resaltar en el trabajo está la correlación significativa entre rendimiento y seguridad. Es decir, el trabajador requiere de un entorno seguro para motivarse y rendir en el puesto de trabajo.

La tesis de Marleny Margarita Díaz de León titulada: “Seguridad en el trabajo y Desempeño Laboral”; buscó determinar la relación existente ente la seguridad en el trabajo y el desempeño de los trabajadores, entendiendo que el conjunto de técnicas y procedimientos que buscan disminuir o eliminar el riesgo de un accidente de trabajo o la adquisición de una enfermedad de corte profesional, era relevante para mejorar el desempeño laboral. Esto lo probó con un enfoque cuantitativo, el cual operacionalizó a través de una escala de Likert y de alcance descriptivo. Concluyó que, contar con medidas de seguridad en el desarrollo de actividades laborales, incrementa el nivel de desempeño de los trabajadores, ya que brinda seguridad al personal de acuerdo a la tarea desempeñada, lo cual les hace incrementar la confianza y enfocarse en sus labores.

La teoría de Perdomo, en su artículo “Actitudes laborales: una mirada desde la teoría” contempla la relación que existe entre actitud y desempeño laboral, aquí es importante destacar que el autor realiza un abordaje teórico y analiza cómo modificar las actitudes en el desempeño laboral, entendiendo la actitud como un aspecto mental que se relaciona con los objetos de interacción del individuo y concluyendo que la actitud laboral se puede influenciar por el entorno de desarrollo de la actividad, se hace incuestionable que las organizaciones tienen obligaciones para con los individuos dentro de ellas para proveer entornos seguros para el desempeño.

En el libro de Jesús Felipe Uribe Prado titulado "Clima y ambiente organizacional: trabajo, salud y factores psicosociales" orienta de manera muy completa al lector en cómo los elementos de clima y ambiente organizacional influyen en el desempeño de los trabajadores, puntualmente, en el capítulo cuatro, se realiza una inmersión en los temas relacionados a la salud ocupacional y la relación ente productividad, salud y trabajo. Si bien es cierto que el abordaje de Uribe y otros se realiza desde el contexto mexicano, da razón de cómo los factores, relacionados con trabajo seguro, tienen estrecha relación con el desempeño de los trabajadores.

Finalmente, se toma también el libro de Lev Vygotsky "El desarrollo de los procesos psicológicos superiores" que va por la misma línea de estudio, pues no es posible desconocer que, las funciones psicológicas superiores como la atención, la toma de decisiones, la planificación el razonamiento e incluso la inhibición, son fundamentales en el desempeño de los trabajadores que desarrollan sus funciones en espacios críticos; en este sentido se denota cómo se sigue entablando una relación entre: la seguridad laboral y la psicología; cuyos procesos son fundamentales en las empresas y para los empleados.

A continuación, agrupamos los textos que mantienen como línea las descripciones, problemáticas, modelos y el sistema de organización de empresas y empleados para así determinar las especificaciones que aplican para esta investigación. Con lo anterior, se busca ampliar el aspecto de lo más general a lo específico. Dentro de los autores encontrados, se destaca el libro de Gerard Karel Boom: "Automatización flexible en la industria"; quien demuestra la importancia de trabajadores en espacios críticos; pues si bien es cierto que da razón

de cómo los procesos de automatización en las industrias ha permitido mejorar el rendimiento y productividad para las industrias, en algunos casos es imposible lograr la mecanización de todas las tareas y para contar con el recursos humano, como ejecutor de actividades, es indispensable garantizar entornos seguros.

El artículo de Manuel Fernández Ríos "Análisis y descripción de puestos de trabajo"; cuyo objetivo fue generar una teoría y métodos para la descripción y el análisis de los puestos de trabajo, nos muestra a través de la revisión literaria, que los factores de valoración de puestos, de acuerdo a lo expuesto en el capítulo 10, debe verificar las condiciones del puesto de trabajo y las capacidades del sujeto, es decir no basta con que el empleador provea de todos los elementos para el adecuado desarrollo de la tarea, se requiere de igual forma que el trabajador cuente con las habilidades que llevan a un óptimo desempeño.

La tesis doctoral de Pablo José Marjalizo titulada "Diseño de equipo de compacto para optimización de trabajos y la minimización de riesgos en el interior de espacios confinados"; realizó un estudio y análisis de las condiciones de los trabajos desarrollados en espacios confinados con el fin único de procurar la optimización en estos espacios de trabajo. El diseño de ese equipo compacto, busca mitigar los riesgos a los cuales se exponen ese tipo de trabajadores, como complemento del equipo de protección personal, mostró, de manera concisa, la experiencia y problemática de los trabajadores en espacios confinados desde el abordaje, con un enfoque mixto, lo cual implicó la investigación y acción participativa para el abordaje cualitativo y la aplicación de instrumentos validados para el abordaje cuantitativo; desde un alcance correlacional

que cuantificó las relaciones entre conceptos y variables de trabajo seguro en espacios confinados, esto permitió, finalmente, el desarrollo de una investigación aplicada.

La monografía de Diana Constanza Ramos Moreno, titulada "El Clima Organizacional, definición, teoría, dimensiones y modelos de abordaje"; cuyo objeto de estudio está en la misma línea de la discusión sobre el clima organizacional y la relación con los conceptos de motivación y satisfacción que llevan a un óptimo desempeño, logra un alcance descriptivo de la investigación que considera el fenómeno midiendo conceptos y definiendo variables, consigue detallar cómo la seguridad en el puesto de trabajo impacta en el clima organizacional porque es una de las dimensiones susceptibles de modificación del comportamiento.

Al igual que el libro de Stephen P. Robbins y Timothy A. Judge "Fundamentos de comportamiento organizacional", en su capítulo 2, nos muestra cómo es necesario que confluyan aptitudes físicas e intelectuales para lograr un óptimo desempeño; en el capítulo 3, da respuesta a cuáles son los factores que determinan la satisfacción dentro de los puestos de trabajo. Aquí, puntualmente, los autores mencionan la necesidad de garantizar entornos seguros para lograr la motivación de los trabajadores.

Finalmente se presenta el informe de la OIT (Organización Internacional del Trabajo) "La recomendación sobre los pisos de protección social, 2012". Que aporta pautas sobre los sistemas de seguridad social dentro de los estados y puntualmente para Colombia, es relevante porque

dentro del sistema, están las administradoras de riesgos laborales que deben propender por la protección y prevención de accidentes y enfermedades laborales.

Estos libros y artículos hicieron posible comprender los diferentes procesos, modelos y organización tanto de las empresas como en sus rutinas de trabajo.

Categoría B.

En esta categoría se agrupan las páginas de organizaciones que aportaron información desde las estadísticas, argumentos destacables que permiten entender el impacto de la seguridad laboral.

Se tuvieron en cuenta las cifras del Consejo Colombiano de Seguridad para triangular aspectos relevantes de esta investigación que permitan entender el impacto de los accidentes laborales y su manera de prevenirlos.

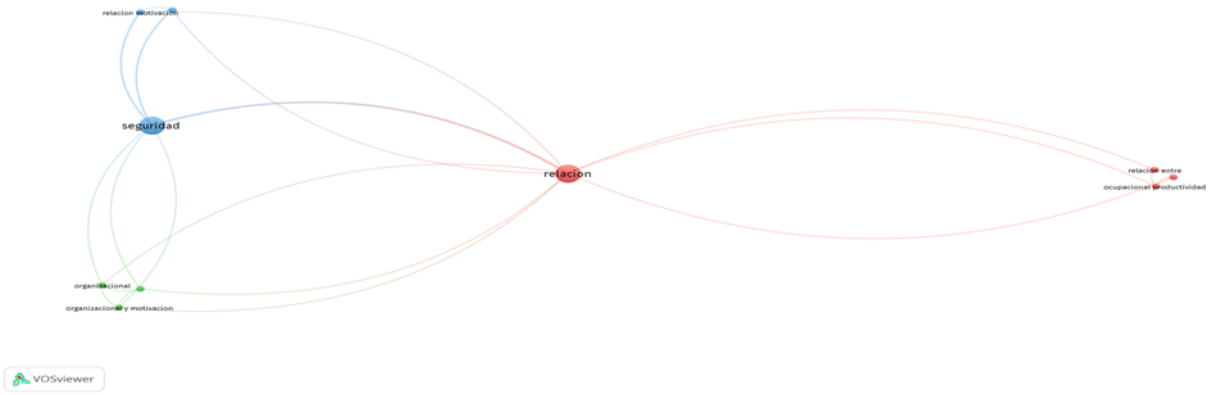
Como se mencionó con anterioridad, estos libros, tesis, artículos y demás han brindado teorías, conceptos y cifras significativas para abordar esta problemática y así cumplir con los objetivos propuestos en la presente investigación. Es importante que este tema se aborde desde diferentes ópticas para entender la repercusión social y generar estrategias que puedan prevenir accidentes.

La seguridad laboral, es un tema que aporta a los avances de las empresas y por ende tiene también una finalidad social; por eso era pertinente que en esta lista se trazarán diferentes referencias, para entender su impacto y su repercusión en diferentes áreas.

A continuación, se presenta la figura 3 de red de coocurrencia, que sirve para identificar las frecuencias y relaciones entre los resultados obtenidos por los diferentes autores revisados en el presente documento. Su estructura presenta 3 clústeres: el primero se puede observar en rojo en la imagen y representa la relación positiva que existe entre la seguridad ocupacional y la productividad, igualmente entre el clima organizacional y el desempeño; el segundo codificado bajo el color verde, en el cual se puede observar que existe una influencia de la cultura organizacional y la motivación y a su vez de la motivación con el desempeño laboral; y finalmente el tercer clúster, con líneas azules, describe la dependencia entre las variables de seguridad o entorno seguro y motivación.

Figura 3

Red de coocurrencia de los resultados obtenidos en la categoría A y B. Software usado VOSviewer



Categoría C: revisión de artículos del portafolio final.

Dentro de los factores determinantes que inciden en el desempeño de los trabajadores en alturas, espacios confinados y caliente, se encontraron el uso de EPP; las inspecciones del área de trabajo, contar con los permisos de trabajo, personal con formación para desarrollar la actividad y una supervisión adecuada. Su relevancia se presenta a través de la gráfica, la cual consiste en una nube de palabras, donde el tamaño de la palabra depende de la frecuencia de uso por parte de diferentes autores, demostrando así que los factores presentados anteriormente fueron determinados por múltiples autores.

Figura 4

Nube de palabras de los resultados obtenidos en la categoría C.

Fuente: Infogram. Recopilaciones de búsqueda.

Por otro lado, se realiza otra nube de palabras enfocada en los autores. En esta se presenta la figura 5 en la que se puede observar que son muchos los autores que se han preocupado por establecer cuáles son los factores que influyen y/o impactan en el desempeño seguro de trabajadores que desempeñan sus actividades en espacios confinados, calientes y alturas.

Figura 5

Nube de palabras de los autores revisados.

Fuente: Infogram. Recopilaciones de búsqueda.

9.0 Conclusiones

El abordaje de este trabajo monográfico, permite dilucidar, de manera general, cuáles son los factores de desempeño seguro para trabajo en espacios confinados, caliente y alturas; mostrando un escenario general de investigaciones que han sido publicadas en diferentes revistas científicas. Durante la pesquisa se tuvo en cuenta los elementos de inclusión descritos en la metodología, procurando mantener un equilibrio entre las fuentes internacionales y regionales.

- Aunque la búsqueda se realizó para los trabajos en espacios confinados, alturas y calientes con la misma rigurosidad, fue evidente la diferencia de cantidad de información en cada campo, resultando más información sobre factores de desempeño seguro en espacios confinados, seguido por trabajo en alturas y por último trabajo en caliente, del cual muy pocos artículos se encontraron. La cantidad y calidad de los textos abordados dan cuenta de la necesidad de seguir profundizando el tema propuesto para esta investigación, en especial lo que corresponde a los factores desempeño seguro para trabajos en caliente. Pese a la exhaustiva revisión literaria que se desarrolló, hay factores que pudieron quedar por fuera.

- Las investigaciones abordadas, se recopilaron de forma viable mediante una pesquisa preliminar en diferentes bases de datos, la cual se trasladó a una matriz de Excel que permitió la depuración de los elementos relevantes para el presente estudio, encontrando así que, los factores más importantes para el desempeño seguro de los trabajadores, son el uso de los equipos de protección personal adecuadamente, las inspecciones del área de trabajo, la obtención y funcionamiento según los permisos de trabajo, un personal capacitado y supervisión constante.

- En total se recopiló la información de 20 artículos, que relacionaban factores para desempeño seguro en espacios confinados, alturas y calientes; se identificó que en la literatura se

le ha prestado mayor atención al estudio de los espacios confinados y se evidencia una oportunidad para desarrollar elementos que aporten a la comprensión de cuáles son los factores de desempeño seguro para los trabajos en caliente.

10.0 Recomendaciones

La generación de un espacio para abordar investigaciones que detallen el trabajo en ambientes calientes y determinen qué factores comunes a investigaciones previas se contemplan como factores de desempeño seguro, así mismo se puedan identificar otros que hayan quedado por fuera. Abordar el trabajo en caliente, permite la construcción de conocimiento útil para la comunidad académica y el sector real.

Realizar investigaciones en empresas especificas donde los empleados desarrollen actividades que estén enmarcadas en esta categoría, permitirá un mejor entendimiento sobre cuáles son los factores de desempeño seguro para tener en cuenta por parte de los encargados de salud y seguridad en el trabajo.

Es menester el desarrollo de trabajos que contemplen el estudio de las variables que pueden confluir para generar factores de desempeño seguro para el trabajo caliente en empresas del sector manufacturero, en especial el metalmecánico que desarrolla diversas actividades de soldadura, oxicorte entre otras.

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Anexos

Para este proyecto de investigación tomamos diferentes lecturas, complementarias a los teóricos de base, para entender el tema propuesto: sus aspectos positivos y negativos y las implicaciones a nivel laboral como reglamentaria y de marco legal. A continuación, presentamos los anexos de lecturas y sus respectivos resúmenes que dan cuenta de lo anteriormente expuesto.

Anexos de lecturas complementarias:

Ramesh Kumar Behera, Md. Izhar Hassan,

Regulatory interventions and industrial accidents: A case from India for 'Vision Zero' goals,

Safety Science,

Volume 113,

2019,

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https://doi.org/10.1016/j.ssci.2018.12.013.

(https://www.sciencedirect.com/science/article/pii/S0925753518307902)

Abstract: Despite best efforts to minimize risk in organizations, accidents appear almost unavoidable due to various reasons. In India and other parts of the world industrial accidents are investigated to know the causes so that recurrence can be minimized by designing adequate preventive measures. However, findings of investigation are seldom used appropriately to strengthen Occupational Safety and Health (OSH). The mineral rich state of Odisha (India), known as a hub for Iron & Steel industries, witnessed frequent accidents during 2005–2009. This article based on study of 982 fatal 'factory-accidents' occurred during 2001–2016, discusses the 'turnaround-story' resulting in reduction of fatal accident from 122 in 2009 to 45 in 2016. The

paper examines the type of accidents, industries and distribution of the year; role of climate and harsh weather conditions on accident causation; impact of regulatory interventions in reducing accidents. Software such as R, SQL, MS-Excel and Tableau were used for analysis of data. It is found that maximum fatality is caused due to ‘fall from height’ (24%) and the harsh weather conditions of summer increase chances of accidents. Further, the study suggests that enforcement of partial work-restriction around lunch time during peak summer and screening and training of employees tend to reduce accidents due to fall from height. The study indicates that preventive enforcement based on learning from experience can be considered as an effective method to improve occupational safety and minimize employment injury in the journey towards ‘Vision Zero’ goal.

Keywords: Occupational accidents in India; Accident investigation; Vision zero goals; Regulatory intervention; Weather and accident; Odisha

Dohyung Kee, Seokhee Na, Min K. Chung,
Comparison of the Ovako Working Posture Analysis System, Rapid Upper Limb Assessment, and Rapid Entire Body Assessment based on the maximum holding times,
International Journal of Industrial Ergonomics,
Volume 77,
2020,
102943,
ISSN 0169-8141,
https://doi.org/10.1016/j.ergon.2020.102943.
(https://www.sciencedirect.com/science/article/pii/S0169814119303919)

Abstract: The objectives of this study were to measure the maximum holding times (MHTs) for symmetric and asymmetric body postures and to compare three representative observational methods, i.e., Ovako Working Posture Analysis System (OWAS), Rapid Upper Limb Assessment (RULA), and Rapid Entire Body Assessment (REBA), based on the MHTs. An experiment was performed to obtain the MHTs, wherein the independent variables were the hand position, trunk rotation angle, and external load. The hand position was defined using the hand height as the percentage of the shoulder height and the hand distance as the percentage of the arm reach. While the four independent variables including the hand height, hand distance, trunk rotation angle, and external load significantly affected the MHTs and RULA grand score at $\alpha = 0.01$, only three of them (except the external load) were significant on the OWAS action category and REBA score. RULA assessed the postures tested in the experiment more stressfully than the OWAS and REBA, and the RULA grand score was more sensitive to the MHTs. In addition, the RULA grand score had larger correlation coefficients with the MHTs and other criteria for postural loads, such as whole-body discomfort, compressive force at L5/S1, and percent capables at the shoulder and trunk, than the OWAS action category and REBA score. Based on the findings of this study, it is concluded that of the three observational methods, RULA may be better for assessing postural loads under the experimental conditions.

Relevance to industry

Work-related musculoskeletal disorders are a major worldwide problem in industries. For preventing their development owing to multiple risk factors, it is important to quantify exposure to such risk factors.

Keywords: Maximum holding time; OWAS; RULA; REBA; Musculoskeletal disorders; Postural load

Barrak Alahmad, Ahmed F. Shakarchi, Haitham Khraishah, Mohammad Alseaidan, Janvier Gasana, Ali Al-Hemoud, Petros Koutrakis, Mary A. Fox,
Extreme temperatures and mortality in Kuwait: Who is vulnerable?,
Science of The Total Environment,
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139289,
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Abstract: Background

Previous climate change temperature-related health studies have been performed mostly in western countries with relatively cooler temperatures than the Gulf region. Regions that are inherently hot, like Kuwait, are witnessing soaring temperatures unlike ever before. Meanwhile, Kuwait and other Gulf countries are unique in their demographic profiles due to the large number of non-national migrant workers.

Objective

To examine the associations of hot and cold temperature extremes on the risk of mortality across gender, age groups and nationality in Kuwait.

Methods

We investigated daily variations of all-cause non-accidental and cardiovascular mortality death counts and ambient temperatures from 2010 to 2016 in a time-series design using a negative binomial distribution. The temperature lag was modeled with distributed lag non-linear models.

Results

A total of 33,472 all-cause non-accidental deaths happened during the study period. For the extreme hot temperatures and over the entire lag period, comparing the 99th percentile of temperature to the minimum mortality temperature, the risk of dying among males was 2.08 (95% CI: 1.23–3.52). Among non-Kuwaitis, males and working age group (15–64 year) had relative risks of death from extreme hot temperatures of 2.90 (1.42–5.93), and 2.59 (1.20–5.59), respectively. For extreme cold temperatures and over the entire lag period, comparing the 1st percentile of temperature to the minimum mortality temperature, the relative risk of death among Kuwaitis was 2.03 (1.05–3.93). Elderly Kuwaitis (65+ year) exposed to extreme cold temperatures had a relative risk of 2.75 (1.16–6.52).

Conclusions

Certain subpopulations in Kuwait are vulnerable to extreme temperatures with doubling to tripling risk of mortality. Nationality is an important effect modifier in temperature-related mortality studies in Kuwait and possibly the Gulf region. To the best of our knowledge, we are the first study to examine specific subpopulation vulnerabilities to temperature in this region. Our findings could carry a potential for broader insight into similar hyper-arid and hot regions.

Keywords: Temperature; Mortality; Kuwait; Gulf; Climate change; Vulnerability; Nationality

M. Furqaan Nai’em, A. Muflihah Darwis, Sholihin Shiddiq Maksun,

Trend analysis and projection of work accidents cases based on work shifts, workers age, and accident types,

Gaceta Sanitaria,

Volume 35, Supplement 1,

2021,

Pages S94-S97,

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https://doi.org/10.1016/j.gaceta.2020.12.026.

(https://www.sciencedirect.com/science/article/pii/S0213911120302855)

Abstract: Objective

To assess the case of work accidents during period (2009–2022) based on work shifts, workers age, and accident types.

Method

The study design was a time series design with data on work accidents at the company period 2009–2015 as the population.

Results

The variable work shift in 2009–2015 was dominated by work accidents on morning shift and night shift of 0.47%. After a projection, it was found that work accidents occurring during the shift will drop from 0.22% to 0.11%. For the years 2009–2015, accidents were dominated by age group of >50 years with a percentage of 0.52%. In 2022 for that category fell by 0%. For work accidents that occurred in 2009–2015, the most cases were falling from a height with a percentage of 0.76–0.17%. In the next seven years, the projection results obtained the highest results turned into work accident with dangerous substances with a percentage of 0.17% in 2016 and increased to 0.30% in 2022.

Conclusions

The trends and predictions from 2016 to 2022 were a decrease in work accidents based on work, a decrease in accidents based on the workers age, and also a decrease on the variable type of accident.

Keywords: Projection; Shift; Trend; Work accident; Workers age

Blesson M. Varghese, Adrian G. Barnett, Alana L. Hansen, Peng Bi, Scott Hanson-Easey, Jane S. Heyworth, Malcolm R. Sim, Dino L. Pisaniello,

The effects of ambient temperatures on the risk of work-related injuries and illnesses: Evidence from Adelaide, Australia 2003–2013,

Environmental Research,

Volume 170,

2019,

Pages 101-109,

ISSN 0013-9351,

https://doi.org/10.1016/j.envres.2018.12.024.

(https://www.sciencedirect.com/science/article/pii/S0013935118306534)

Abstract: Background

The thermal environment can directly affect workers' occupational health and safety, and act as a contributing factor to injury or illness. However, the literature addressing risks posed by varying temperatures on work-related injuries and illnesses is limited.

Objectives

To examine the occupational injury and illness risk profiles for hot and cold conditions.

Methods

Daily numbers of workers' compensation claims in Adelaide, South Australia from 2003 to 2013 (n = 224,631) were sourced together with daily weather data. The impacts of maximum daily temperature on the risk of work-related injuries and illnesses was assessed using a time-stratified case-crossover study design combined with a distributed lag non-linear model.

Results

The minimum number of workers' compensation claims occurred when the maximum daily temperature was 25 °C. Compared with this optimal temperature, extremely hot temperatures (99th percentile) were associated with an increase in overall claims (RR: 1.30, 95%CI: 1.18–1.44) whereas a non-significant increase was observed with extremely cold temperatures (1st percentile, RR: 1.10 (95%CI: 0.99–1.21). Heat exposure had an acute effect on workers' injuries whereas cold conditions resulted in delayed effects. Moderate temperatures were associated with a greater injury burden than extreme temperatures.

Conclusion

Days of very high temperatures were associated with the greatest risks of occupational injuries; whereas moderate temperatures, which occur more commonly, have the greatest burden. These findings suggest that the broader range of thermal conditions should be considered in workplace injury and illness prevention strategies.

Keywords: Occupational Health; Temperature; Injuries; Case-crossover design; Attributable risk; Distributed lag non-linear model

Bilal Manzoor, Idris Othman, Muneeb Manzoor,

Evaluating the critical safety factors causing accidents in high-rise building projects,

Ain Shams Engineering Journal,

Volume 12, Issue 3,

2021,

Pages 2485-2492,

ISSN 2090-4479,

https://doi.org/10.1016/j.asej.2020.11.025.

(https://www.sciencedirect.com/science/article/pii/S2090447921000915)

Abstract: The Malaysian construction industry plays a vital role in the economic growth of the country. However, on the other side, the annually increasing number of fatality and accidental rates on the construction sites are a serious concern, and statistics are alarming. This study has been administered with the help of questionnaire survey comprising of ten groups, including sixty-two critical safety factors. These factors were identified from the literature, and questionnaire feedback was collected from contractors, clients and consultants for this study. The outcome of this study revealed that the “fall from roofs/floor (working at height or open edges without using fall-protection systems)” is the topmost critical factor among the identified high ranked ten critical safety factors, which usually causes accidents in high-rise building projects. This study gives a clear picture of critical safety factors with practical knowledge to construction safety managers which would make the execution of building projects safer.

Keywords: Critical safety factors; Building projects; Accidents

Mohammad Z. Shanti, Chung-Suk Cho, Borja Garcia de Soto, Young-Ji Byon, Chan Yeob Yeun, Tae Yeon Kim,

Real-time monitoring of work-at-height safety hazards in construction sites using drones and deep learning,

Journal of Safety Research,

2022,

,

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https://doi.org/10.1016/j.jsr.2022.09.011.

(https://www.sciencedirect.com/science/article/pii/S0022437522001475)

Abstract: Introduction: The construction field is considered one of the most dangerous industries. Accidents and fatalities take place on a daily basis in construction projects. Globally, different levels of government have implemented strict rules and regulations to protect workers on job sites. However, despite the efforts to implement the rules and regulations, accidents occur frequently. Falling from heights is considered the most common cause of death in construction. This study developed a novel system integrating deep learning and drones to monitor workers in real-time when performing at-height activities. Method: Specifically, a pre-trained deep learning model was used to detect Personal Fall Arrest System components (e.g., safety harness, lifeline, and helmet). The drone was utilized to take images and videos from the construction site, and the data were relayed to the model to detect safety violations. The system was tested and validated in real construction sites and in a controlled lab environment to verify the model's effectiveness under different light and weather conditions. Results: The overall accuracy of the system was 90%. The model's precision and recall were 97.2 % and 90.2%, respectively. The average time taken to detect a violation was around 12 seconds. Conclusions: Moreover, the Area Under Curve - Receiver Operating Characteristics chart showed that the trained model was very good and precise in detecting and differentiating the desired objects. Practical Applications: This fast, reliable, and economical system can aid in saving many lives if implemented and utilized properly in real construction sites.

Keywords: Machine learning; Real-time detection; Unmanned Aerial Vehicles (UAV); Fall from heights; Personal Fall Arrest System (PFAS)

Francesco Lolli, Antonio Maria Coruzzolo, Elia Balugani,

The Indoor Environmental Quality: A TOPSIS-based approach with indirect elicitation of criteria weights,

Safety Science,

Volume 148,

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105652,

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https://doi.org/10.1016/j.ssci.2021.105652.

(https://www.sciencedirect.com/science/article/pii/S0925753521004926)

Abstract: The Indoor Environmental Quality (IEQ) assessment is a hot topic both for designers of industrial buildings and for academics since it has been proven to affect workers' productivity. Despite the advantages of indirect eliciting approaches, only direct eliciting is used in the literature to assign weights to the main risks included in the IEQ assessment, i.e., those referring to the thermal comfort, visual comfort, acoustic comfort and indoor air quality. In order to bridge this gap and in line with the drivers of the human-centric industrial revolution, we have developed an indirect eliciting approach based on logistic regression and integer optimization that indirectly derives the aforementioned weights per worker (i.e., individual weighting) on the basis of the overall comfort perceived by him/her in different reference scenarios. These weights are then used to compute a TOPSIS-based risk measure that maps the aggregated, individual and dynamic risks to which the worker is subjected over time. A real case study is used to validate our proposal. The achieved results highlight the superiority of our indirect eliciting approach compared to the Analytical Hierarchic Process in reconstructing the overall comfort perceived by workers, as well as that age plays a crucial role to assign weights to the main risks included in the IEQ.

Keywords: Occupational Health and Safety; Comfort; Indirect elicitation; 5.0 human-centric revolution; Ageing workforce

Numan Khan, Muhammad Rakeh Saleem, Doyeop Lee, Man-Woo Park, Chansik Park,
Utilizing safety rule correlation for mobile scaffolds monitoring leveraging deep convolution neural networks,
Computers in Industry,
Volume 129,
2021,
103448,
ISSN 0166-3615,
https://doi.org/10.1016/j.compind.2021.103448.
(https://www.sciencedirect.com/science/article/pii/S0166361521000555)
Abstract: Falls from height (FFH) are still a leading cause of fatalities in the construction industry, which also includes scaffolding-related accidents. Despite regular safety inspections, numerous scaffolding-related accidents occur at the construction site. The current safety monitoring practices are not only impractical but infeasible due to dynamicity of construction environment. Since a separate computer training and detection process is generally required to acquire spatiotemporal reasoning to control a single hazard; thus previous efforts in vision intelligence applications to improve safety monitoring are still limited to specific hazards. Also, in regard to detecting unsafe situations based on extracted correlations from safety rules, to date, previous studies have devoted little attention to this domain. To address these issues, this study proposes a correlation-based approach for mobile scaffold safety monitoring and detecting worker's unsafe behaviors. A deep neural network, Mask R-CNN, was used as classification and segmentation of worker's tasks combined with object correlation detection (OCD) module to identify worker's unsafe behaviors. The approach divides the overall construction worker's safety

into two subsets, classification of worker and detection of safe (class-1) and unsafe (class-2) behavior using OCD block. The overall performance was evaluated on set of real scenarios with test results showing 85 % and 97 % precision and recall for class-1 (safe behavior) and 91 % and 65 % precision and recall for class-2 (unsafe behavior). The overall accuracy of 86 % confirms the Mask R-CNN-based OCD module's applicability for detecting worker's unsafe behavior effectively in a construction environment.

Keywords: Safety rule compliance; Deep learning; Safety risk correlation pattern; Risk recognition; Safety monitoring

Nigel A.S. Taylor, Joo-Young Lee, Siyeon Kim, Sean R. Notley,

Physiological interactions with personal-protective clothing, physically demanding work and global warming: An Asia-Pacific perspective,

Journal of Thermal Biology,

Volume 97,

2021,

102858,

ISSN 0306-4565,

https://doi.org/10.1016/j.jtherbio.2021.102858.

(https://www.sciencedirect.com/science/article/pii/S0306456521000255)

Abstract: The Asia-Pacific contains over half of the world's population, 21 countries have a Gross Domestic Product <25% of the world's largest economy, many countries have tropical climates and all suffer the impact of global warming. That ‘perfect storm’ exacerbates the risk of occupational heat illness, yet first responders must perform physically demanding work wearing personal-protective clothing and equipment. Unfortunately, the Eurocentric emphasis of past

research has sometimes reduced its applicability to other ethnic groups. To redress that imbalance, relevant contemporary research has been reviewed, to which has been added information applicable to people of Asian, Melanesian and Polynesian ancestry. An epidemiological triad is used to identify the causal agents and host factors of work intolerance within hot-humid climates, commencing with the size dependency of resting metabolism and heat production accompanying load carriage, followed by a progression from the impact of single-layered clothing through to encapsulating ensembles. A morphological hypothesis is presented to account for inter-individual differences in heat production and heat loss, which seems to explain apparent ethnic- and gender-related differences in thermoregulation, at least within thermally compensable states. The mechanisms underlying work intolerance, cardiovascular insufficiency and heat illness are reviewed, along with epidemiological data from the Asia-Pacific. Finally, evidence-based preventative and treatment strategies are presented and updated concerning moisture-management fabrics and barriers, dehydration, pre- and post-exercise cooling, and heat adaptation. An extensive reference list is provided, with >25 recommendations enabling physiologists, occupational health specialists, policy makers, purchasing officers and manufacturers to rapidly extract interpretative outcomes pertinent to the Asia-Pacific.

Keywords: Ageing; Clothing; Cooling; Dehydration; Ethnic; Firefighters; Gender; Heat adaptation; Heat illness; Load carriage; Protective clothing

Muizz O. Sanni-Anibire, Babatunde Abiodun Salami, Nimot Muili,

A framework for the safe use of bamboo scaffolding in the Nigerian construction industry,

Safety Science,

Volume 151,

2022,

105725,

ISSN 0925-7535,

https://doi.org/10.1016/j.ssci.2022.105725.

(https://www.sciencedirect.com/science/article/pii/S0925753522000650)

Abstract: The construction industry is one of the most hazardous industries globally. Falls from height due to scaffolding accidents have consistently been ranked as one of the most prevalent accidents in the industry. Although safety programs to mitigate these hazards have been implemented in many developed countries, this is not the case in developing countries such as Nigeria. Previous research studies suggest the lack of guidelines, regulations, and awareness in these countries as the root cause of accidents. Bamboo scaffolds are a common form of access for work at height in Nigeria because of their wide availability, affordability, material strength, and environmental sustainability. However, guidelines for the safe use of this equipment are lacking. This study developed a framework conveyed through a set of guidelines for the safe use of bamboo scaffolds in Nigeria. The guidelines were gathered under 35 subprocesses, which were presented in six process groups: planning, design, erection, operation, inspection and maintenance, and dismantling. The framework was further validated by experts in the construction industry in Nigeria. This study has implications for stakeholders in the construction industry in Nigeria, as well as other similar construction climes in developing countries.

Keywords: Falls; Work at heights; Access equipment; Scaffolds; Bamboo; Construction safety

Fuqiang Yang, Yujie Huang, Jing Tao, Genserik Reniers, Chao Chen,

Visualized analysis of safety climate research: A bibliometric data mining approach,

Safety Science,

Volume 158,

2023,

105973,

ISSN 0925-7535,

https://doi.org/10.1016/j.ssci.2022.105973.

(https://www.sciencedirect.com/science/article/pii/S0925753522003125)

Abstract: It is well known that safety climate (SC) has paramount significance in safety science and accident prevention. In this paper, a bibliometric data mining is conducted to systematically review the research domain of SC. Overall, 1624 documents on SC are obtained, covering 4830 authors, 473 journals, 89 countries/regions, and 1766 institutions between 1980 and 2021. SC has obtained increasing attention since the number of publications related to SC grew from 1 in 1980 to 188 in 2020. Based on the bibliometric data, network analysis was carried out to understand the relationship among different countries/regions, authors, and keywords. Safety Science, Journal of Safety Research, and Accident Analysis and Prevention are the major sources of SC publications, and the USA, Australia, and China lead scientific collaboration production on SC research. Then, text mining of publication keywords is used to identify the hot topics and the evolution of mainstream research over time in the SC domain. The dominant topics in SC research include culture, performance, safety behavior, and model. Meanwhile, the limitations of past research on SC are analyzed and the differences between SC and safety culture are discussed. Moreover, recommendations for future research on SC are also given based on the results of bibliometric analysis and existing literature reviews.

Keywords: Safety climate; Safety management; Data mining; Bibliometric analysis; Network analysis

Marko Djapan, Ivan Macuzic, Danijela Tadic, Gabriele Baldissone,

An innovative prognostic risk assessment tool for manufacturing sector based on the management of the human, organizational and technical/technological factors,

Safety Science,

Volume 119,

2019,

Pages 280-291,

ISSN 0925-7535,

https://doi.org/10.1016/j.ssci.2018.02.032.

(https://www.sciencedirect.com/science/article/pii/S0925753518303552)

Abstract: The article deals with an innovative methodology for risk assessment concerning human, organizational and technical/technological (HOT) factors, based on fuzzy set theory. The aim of this paper is to propose user-friendly prognostic risk assessment tool (PgRA) by obtaining reliable results and supporting further decisions of the safety managers. The HOT factors are introduced with associated sub-factors. The user-friendly interface developed in Matlab environment provides multiple opportunities for further improvement. The settings presented in this article are strictly applied for, but not limited to manufacturing sector. Flexibility of the PgRA tool allows adjustments and customize model regarding the group of the companies. With introduction of fuzzy set theory in the risk assessment process, level of subjectivity is reduced to the minimum. Practical applications: Possibilities of the practical application are modeled to assist in decrease of identified risks during daily work. This is a useful visual management tool, helpful to all safety managers in planning workplace improvements. The safety managers are in position to predict risk level before the real measures are taken. They are able to show the possible realistic results and risk trend behaviour to their supervisor/director, without spending any financial resources.

Keywords: Prognostics; Fuzzy set theory; User-friendly interface; Proactivity; Risk trend

Kenneth Lawani, Billy Hare, Iain Cameron,

Integrating early refresher practice in height safety and rescue training,

Safety Science,

Volume 110, Part A,

2018,

Pages 411-417,

ISSN 0925-7535,

https://doi.org/10.1016/j.ssci.2018.03.029.

(https://www.sciencedirect.com/science/article/pii/S0925753517309840)

Abstract: The non-routine practice of wind turbine height safety and rescue skills after training has significant impact on the competency and health and safety of construction and maintenance technicians. The proposition is that wind technicians who undertake initial training without practically carrying out hands-on rescue roles are most likely to forget the procedural steps during emergencies except there is an early refresher practice integrated within the system. Longitudinal study of 30 (subsample) wind technicians using Job Knowledge Test (JKT), hands-on practice test with Situational Judgment Test (SJT) and pictograph of the rescue device was employed. While the level of performance of wind technicians improved during acquisition, there was observed decline in performances over one and three month non-practice intervals. This confirms the significance of integrating early refresher practice of rescue and evacuation skills and the factors influencing the competence of the technicians over these timescale. To improve the competency of technicians and reduce the risk of injury or failed rescue, actual timescales

have been identified showing that early refresher practice should be undertaken at three months after acquisition for returning technicians and within one month for new technicians.

Keywords: Wind technician; Wind turbine; Job knowledge test; Situational judgment test; Wind turbines standards

Mahin Hosseininejad, Fateme salehi, Elham Mirzamohammadi, Seyed Abolfazl Mohsenizadeh, Saber Mohammadi,

The relationship between occupational exposure to organic solvents and metabolic syndrome in petroleum refinery workers in Tehran, Iran,

Diabetes & Metabolic Syndrome: Clinical Research & Reviews,

Volume 15, Issue 5,

2021,

102223,

ISSN 1871-4021,

https://doi.org/10.1016/j.dsx.2021.102223.

(https://www.sciencedirect.com/science/article/pii/S1871402121002435)

Abstract: Aims

The rising prevalence of metabolic syndrome has made it a major health concern. Chronic occupational exposure to organic solvents affects different systems of the body. This study aimed to investigate the association between exposure to organic solvents and the prevalence of metabolic syndrome in petroleum refinery workers.

Method

This study was conducted in 2019–2020 on workers employed in an Iranian petroleum refinery. The demographic and occupational information on the participants was obtained using the

interview method. Their height, weight, and blood pressure were measured by the occupational health team, and fasting blood samples were taken from them to measure the paraclinical parameters.

Results

In this study, 1009 petroleum refinery workers were analyzed. The prevalence of metabolic syndrome in workers was 20.1% and it was about two times higher in exposed workers (CI 95%: 1.61–3.35) compared to non-exposed ones. Factors associated with the prevalence of metabolic syndrome include age, higher BMI, exercise, and longer exposure to organic solvents.

Conclusion

Findings of this study suggested that exposure to organic solvents is associated with increased prevalence of metabolic syndrome (the highest association was observed with elevated serum triglycerides). Besides, longer exposure to organic solvents increased the risk of developing metabolic syndrome.

Keywords: Metabolic syndrome; Occupational exposure; Organic solvents

Manoj Kurien, Min-Koo Kim, Marianna Kopsida, Ioannis Brilakis,

Real-time simulation of construction workers using combined human body and hand tracking for robotic construction worker system,

Automation in Construction,

Volume 86,

2018,

Pages 125-137,

ISSN 0926-5805,

https://doi.org/10.1016/j.autcon.2017.11.005.

(https://www.sciencedirect.com/science/article/pii/S0926580517300493)

Abstract: Construction is an inherently less safe sector than other sectors because it exposes workers to harsh and dangerous working environments. The nature of the construction industry results in a comparatively high incidence of serious injuries and death caused by falls from a height, musculoskeletal disorders and being struck by objects. This paper presents a new concept that can tackle this problem in the future. The central hypothesis of this study is that it is possible to eliminate injuries if we move the human construction worker off-site and remotely link his/her motions to a Robotic Construction Worker (RCW) on-site. As a first steppingstone towards this ultimate goal, two systems essential for the RCW were developed in this study. First, a novel system that combines 3D body and hand position tracking was developed to capture the movements of human construction worker. This combination of tracking enables the capture of changes in the orientations and articulations of the entire human body. Second, a real-time simulation system that connects a human construction worker off-site to a virtual RCW was developed to demonstrate the proposed concept in a variety of construction scenarios. The simulation results demonstrate the future viability of the RCW concept and indicate the promise of this system for eliminating the health and safety risks faced by human construction workers.

Keywords: Construction site safety; Construction worker; Human body tracking; Hand tracking; Construction simulation; Robotic construction worker (RCW); Robotics

Yuta J. Masuda, Brianna Castro, Ike Aggraeni, Nicholas H. Wolff, Kristie Ebi, Teevrat Garg, Edward T. Game, Jennifer Krenz, June Spector,

How are healthy, working populations affected by increasing temperatures in the tropics? Implications for climate change adaptation policies,

Global Environmental Change,

Volume 56,

2019,

Pages 29-40,

ISSN 0959-3780,

https://doi.org/10.1016/j.gloenvcha.2019.03.005.

(https://www.sciencedirect.com/science/article/pii/S095937801830788X)

Abstract: Climate change and land use change are increasing average and extreme temperatures. Hotter temperatures can detrimentally affect workers' health and their economic productivity and livelihoods, especially in rural areas in industrializing countries that may be more vulnerable and less resilient. A growing literature has examined these factors at large spatial scales, yet few studies have done so at finer scales. Micro-level data from developing regions is needed to understand the extent of heat exposure, as well as current and future adaptation strategies of working, healthy, and rural populations. We fill this gap using objective environmental measurements from 3MTM QuestempTM 46 Heat Stress Monitors, as well as survey data from working, healthy, and rural communities in East Kalimantan, Indonesia. Our data contain two groups: those who work in only open areas, and those who work in both forests and open areas. We document workers' livelihood strategies, work schedules, perceptions of how temperatures impact their work, and future adaptation strategies for even hotter days. Ambient temperatures are 2.6–8.3 °C cooler in forests compared to open areas, indicating the temperature effects of deforestation can be immediate and significant. Those working only in open areas face up to 6.5 h of exposure to temperatures above the accepted Threshold Limit Value for worker well-being. Workers adapt to hotter temperatures by altering the timing of their work shifts and breaks, indicating our sample is already adapting to increasing temperatures from climate and land use change. We also find differential adaptation strategies between those working only in open areas

compared to those working in both forests and open areas, suggesting current acclimatization may be a factor in how people adapt. Our results suggest the need for adaptation and mitigation policies tailored to the unique constraints of rural workers that specifically incorporate extant adaptation strategies.

Keywords: Climate change; Heat exposure; Deforestation; Human well-being; Adaptation; Livelihoods

Banibrata Das,

Prevalence of work-related occupational injuries and its risk factors among brickfield workers in West Bengal, India,

International Journal of Industrial Ergonomics,

Volume 80,

2020,

103052,

ISSN 0169-8141,

https://doi.org/10.1016/j.ergon.2020.103052.

(https://www.sciencedirect.com/science/article/pii/S0169814118306036)

Abstract: The manual brick making process is a physically demanding job with a high risk of work-related injuries. Prevalence of work-related injuries (17.55%) occurs frequently in manual brick making activities due to inherently hazardous nature. This study analyzes 451 recordable incidents that occurred over a period of 7 years (2011–2017) among 220 male and 180 female workers in a different brickfield of West Bengal, India. The leading cause of brickfield injury was fall from heights, struck by objects, overexertion, lack of awareness, slippage of spade while mud collection etc. Carrying bricks and spading are two activities, in which the injuries occurred most

among female and male brickfield workers respectively. Risk factors like MMH, prolonged working time, repetitiveness, awkward posture, lack of rotational task, overcrowded work, Lack of personal protective device, and lastly sleep disturbance and poor income are the key factor for work-related injuries. Sprain and strain, cut or laceration, abrasion, avulsion, and snake or insect bite are the main injuries among both groups of brickfield workers. Lower back and toes are the most affected parts of the body followed by ankle, feet, and hand. From this study, it was also observed that female brickfield workers are much more affected than male agricultural workers. The incident rate among male and female brickfield workers was 18.7 per 1000 workers per year and 21.2 per 1000 workers per year, respectively. So due to injuries in both groups of brickfield workers, their health, productivity and work performance were consequently affected.

Keywords: Work-related injuries; Brickfield workers; Incident rate; Risk factors; Workplace safety

Zhang Qian, Lu Wei, Wu Mingyue, Qi Guansheng,

Application of amine-modified porous materials for CO2 adsorption in mine confined spaces,

Colloids and Surfaces A: Physicochemical and Engineering Aspects,

Volume 629,

2021,

127483,

ISSN 0927-7757,

https://doi.org/10.1016/j.colsurfa.2021.127483.

(https://www.sciencedirect.com/science/article/pii/S0927775721013522)

Abstract: The confined space of a mine provides temporary protection measures and life support to miners awaiting rescue after a mine accident. Among the protection measures, the removal of

CO2 from confined spaces is the key technology for air purification technologies for air purification, and amine-based modified porous material adsorbent (zeolite, activated carbon, fiber, etc.) have the advantages of low toxicity, high adsorption stability, simple preparation, etc., suitable as an adsorbent for CO2 purification in confined spaces. By grafting or impregnating amines on the surface of the porous material, adjusting the structure of the porous material and changing the adsorption performance is an effective method to improve the adsorption performance of the porous adsorbent. The preparation methods, surface modifiers, porous materials, adsorption mechanism and CO2 adsorption efficiency of amine-based modified porous materials are reviewed, and the applications prospects of amine-porous materials in special environments such as coal mines are discussed.

Keywords: Confined workspaces in mines; Impregnation method; Grafting method; Amine-modified porous material; CO2 capture

Adel Thaljaoui, Salim El khediri, Sherali Zeadally, Abdullah Alourani,
Remote monitoring system using Light Fidelity and InfraRed technologies,
Computers and Electrical Engineering,
Volume 101,
2022,
108073,
ISSN 0045-7906,
https://doi.org/10.1016/j.compeleceng.2022.108073.
(https://www.sciencedirect.com/science/article/pii/S0045790622003287)

Abstract: In the context of new emerging infectious diseases, it is more secure for old patients to be confined to their homes while still having medical assistance. Most existing facilities use

Radio Frequency (RF) devices to monitor and measure vital signs of a patient and send them to appropriate medical services. But this technology can have bad side effects on patient's health, especially those who have already chronic diseases. We propose an approach that uses only Light Fidelity (LiFi) technology. Our goal is to use the information about the position of the patient to track him/her so that rapid intervention can be made in critical situations. Initial experiments conducted on our system show that the patient can be tracked with precision. The real-time status of the person being monitored is reported to medical services so that he/she can be quickly rescued when needed.

Keywords: Healthcare; LiFi; InfraRed; Localization; Wireless sensor networks

Anna Sjörs Dahlman, Anna Anund,

Seroprevalence of SARS-CoV-2 antibodies among public transport workers in Sweden,

Journal of Transport & Health,

Volume 27,

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101508,

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https://doi.org/10.1016/j.jth.2022.101508.

(https://www.sciencedirect.com/science/article/pii/S2214140522001803)

Abstract: Introduction

Public transportation is an essential societal function in crisis situations like the coronavirus disease 2019 (COVID-19) pandemic. Bus drivers and other public transport workers are essential workers that need to keep working despite the risk of contagion. The SARS-CoV-2 virus may pose an occupational health risk to public transport workers and especially to bus drivers as they

interact with passengers in a confined area. By analyzing antibodies towards SARS-CoV-2 proteins in blood samples it is possible to measure if an individual has been infected by COVID-19. Here, we report the prevalence of antibodies among bus drivers and other public transport employees in Stockholm, Sweden and relate it to socio-demographic factors.

Methods

Seroprevalence of IgG antibodies towards SARS-CoV-2 proteins was investigated in a sample of 262 non-vaccinated public transport workers (182 men and 40 women) recruited between April 26 and May 7, 2021. Most of the participants were bus drivers (n = 222). The relationship between socio-demographic factors and seroprevalence was investigated with logistic regression.

Results

The seroprevalence was 50% in the total sample of public transport workers. Among bus drivers, 51% were seropositive compared to 44% seropositive among the other public transport workers. The difference was not significant. The seroprevalence was higher than the national seroprevalence in Sweden during the same period (18.3% in non-vaccinated people aged 20–64 years). The logistic regression model using Wald forward selection showed that men had a higher risk of being seropositive (OR 2.7, 95% CI 1.3 – 5.8) and there was a higher risk with increasing number of people in the household (OR 1.3, 95% CI 1.1 – 1.6).

Conclusions

These findings could imply an occupational risk for COVID-19 infection among public transport workers. Infection control measures are warranted during virus epidemics to assure bus drives' safety and reduce transmission in public transport.

Keywords: COVID-19; Bus driver; Public transport; Seroprevalence; SARS-CoV-2; Infection control

San He, Huilan Xu, Jianxiong Zhang, Peiqiang Xue,
Risk assessment of oil and gas pipelines hot work based on AHP-FCE,
Petroleum,
2022,
,
ISSN 2405-6561,
https://doi.org/10.1016/j.petlm.2022.03.006.
(https://www.sciencedirect.com/science/article/pii/S2405656122000244)
Abstract: A new quantitative risk assessment method for hot work is proposed based on the Analytic Hierarchy Process (AHP) and Fuzzy Comprehensive Evaluation (FCE). It can help pipeline companies realize the risk management of hot work and further ensure the safe operation of oil and gas pipelines. Taking one natural gas pipeline in China as an example, this paper evaluates the risk of a single hot work in the spring of one natural gas pipeline in a high consequence region. First of all, the risk factors are determined with reference to the job safety analysis (JSA), and then experts were invited to fill out a questionnaire to collect their opinions. According to the results of the questionnaire, AHP is used to calculate the weight coefficients of the evaluation indicators, and FCE is used to evaluate the risk level of hot work. After calculation, the comprehensive risk score of hot work is 40.888. It belongs to a "General risk". This method can not only quantitatively evaluate the risk levels of hot work, but also reasonably sort the importance of various risk factors. It is helpful for the effective management of hot work and provides suggestions for implementing control measures.
Keywords: Oil and gas pipelines; Hot work; Risk assessment; Analytic hierarchy process (AHP); Fuzzy comprehensive evaluation (FCE)

Jennie A. Jackson, Per Liv, Arkan S. Sayed-Noor, Laura Punnett, Jens Wahlström,

Risk factors for surgically treated cervical spondylosis in male construction workers: a 20-year prospective study,

The Spine Journal,

2022,

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ISSN 1529-9430,

https://doi.org/10.1016/j.spinee.2022.08.009.

(https://www.sciencedirect.com/science/article/pii/S1529943022008725)

Abstract: BACKGROUND CONTEXT

Degenerative changes due to cervical spondylosis (CS) can detrimentally affect work ability and quality of life yet understanding of how physical exposure affects disease progression is limited.

PURPOSE

To assess the associations between occupational physical exposures and occurrence of surgically treated cervical spondylosis (ST-CS) and early exit from the labor market via disability pension.

STUDY DESIGN/SETTING

Prospective register study with 20 years follow-up period.

PATIENT SAMPLE

Swedish construction workers participating in a national health surveillance project conducted between 1971 and 1993.

OUTCOME MEASURES

Surgically treated cervical spondylosis (ST-CS) and early labor market exit at a minimum rate of 25% time on disability pension.

METHODS

Associations between occupational physical exposures (job exposure matrix) and subsequent ST-CS (National Hospital in-patient register) and early labor market exit via disability pension (Swedish Social Insurance Agency register) were assessed in a cohort of male construction workers (n=237,699).

RESULTS

A total of 1381 ST-CS cases were present and a 20 years incidence rate of 35.1 cases per 100,000 person years (95% confidence interval (CI) 33.2–36.9). Increased relative risk (RR) for ST-CS was found for workers exposed to non-neutral (RR 1.40, 95% CI 1.15–1.69), and awkward neck postures (1.52, 1.19–1.95), working with the hands above shoulder height (1.30, 1.06–1.60), and high upper extremity loading (1.35, 1.15–1.59). Increased risk was also present for workers who reported frequent neck (3.06, 2.18–4.30) and upper back (3.84, 2.57–5.73) pain in the 12 months prior to survey. Among workers with elevated arm exposure, higher risk was seen in those who also had more frequent neck pain. ST-CS cases took early retirement more often (41.3%) and at a younger age (53 years) than the total study cohort (14.8% and 56 years of age, respectively).

CONCLUSIONS

Occupational exposure to non-neutral neck postures, work with hands above shoulders and high loads born through the upper extremities increased the risk for ST-CS and early retirement due to disability. Decreasing postural and load exposure is salient for primary, secondary, and tertiary prevention of CS. Neck pain was shown to be a prognostic factor for ST-CS, which stresses the importance of acting early and taking preventative action to reduce workplace exposure, and the need for systematic medical check-ups within primary or occupational care to mitigate disease progression and early labour market exit due to disability.

Keywords: Early-retirement; Hand tools; Job exposure matrix; Neck pain; Repetitive; Static work; Upper-back pain

Sarah Gharib, Bernard Martin, Richard L. Neitzel,

Pilot assessment of occupational safety and health of workers in an aircraft maintenance facility,

Safety Science,

Volume 141,

2021,

105299,

ISSN 0925-7535,

https://doi.org/10.1016/j.ssci.2021.105299.

(https://www.sciencedirect.com/science/article/pii/S0925753521001442)

Abstract: Aircraft maintenance workers work in a dynamic and complex environment and may face a variety of occupational hazards. This pilot study was conducted with an international airline in the Middle East to assess occupational safety and health issues at their maintenance base. In this study, volunteer workers in two hangars at an aircraft maintenance base completed a baseline questionnaire on several occupational safety and health factors (e.g., behaviors, injuries, near misses, and safety climate). They also completed two full-shift noise measurements and filled out a diary to report activities, injuries, and near misses on both measurement days. Repeated anonymous observations of workers were made to assess unsafe conditions and behaviors, and area temperature measurements were taken to evaluate potential heat stress. Sixty-four maintenance workers, sixty-three males and one female, volunteered to participate, (range 24–64 years old). Maintenance workers were comprised of engineers, mechanics, and laborers, split evenly between two teams. The overall safety climate score was 3.9 (on a scale of 0–5, with 5 indicating best climate), suggesting a relatively strong safety climate. However, participants indicated that they had not received safety or emergency response training. Observations showed

that engineers faced ergonomic hazards and did not use personal protective equipment, while mechanics faced ergonomic and fall hazards, and laborers faced more chemical hazards. Mechanics and engineers had safety climate scores that were lower than laborers. Roughly 40% of 125 noise measurements exceeded the recommended 85 dBA Threshold Limit Value (TLV) recommended by the American Conference of Governmental Industrial Hygienists, and the recommended 28 °C TLV for Heat Stress was routinely exceeded in one of the hangars. The most common issues identified through 310 hazard observations were ergonomic and fall hazards and failure to use personal protective equipment. The 5 reported near misses and injuries were associated with ergonomic, fall, housekeeping, and communication issues, and high noise above 85 dBA was present during 80% of these events. Our results suggest that improvements in safety training, noise and heat stress management, and use of personal protective equipment are warranted at the facility.

Keywords: Occupational safety; Aircraft maintenance; Injuries; Noise; Heat; Ergonomics

Blesson M. Varghese, Alana L. Hansen, Susan Williams, Peng Bi, Scott Hanson-Easey, Adrian G. Barnett, Jane S. Heyworth, Malcolm R. Sim, Shelley Rowett, Monika Nitschke, Ross Di Corleto, Dino L. Pisaniello,

Heat-related injuries in Australian workplaces: Perspectives from health and safety representatives,

Safety Science,

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2020,

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(https://www.sciencedirect.com/science/article/pii/S0925753520300485)

Abstract: Introduction

Hot weather poses occupational health and safety concerns for people working in hot environments. It is known that work-related injuries increase during hot weather, yet there is an incomplete understanding of the underlying factors.

Methods

A national online survey was conducted in Australia among health and safety representatives (HSRs) to better understand factors contributing to heat-related injuries in workplaces. Risk factors and preventive measures associated with reported injuries were identified using log-poisson regression models.

Results

In total, 222 HSRs completed the survey. Overall, 43% reported that injuries or incidents caused by hot/very humid weather occur sometimes or often in their workplace. Factors found to be associated with reported heat-related injuries included ‘the wearing of personal protective equipment (PPE)’ which can hinder the loss of body heat, and ‘inadequate resources and facilities’. ‘Piece-rate workers’ and ‘new workers’ were identified as being at high risk. The most frequently adopted preventive measures for outdoor and indoor workers were the provision of PPE (despite some identified issues) and access to cool drinking water. HSRs reported that less injuries occurred in hot weather among outdoor workers if work was rescheduled to cooler times and shade was provided; and in indoor environments where there was adequate ventilation, heat sources were shielded and workers were able to self-pace.

Conclusion

Organisational issues, workplace hazards, personal factors and preventive measures, are all determinants of heat-related injuries in Australian workplaces. Wider adoption of identified prevention measures could reduce the incidence of heat-related injuries in outdoor and indoor workplaces.

Keywords: Occupational health; Workplace heat exposure; Work-related injuries; Perceptions; Safety representatives

Kyungsu Kang, Hanguk Ryu,

Predicting types of occupational accidents at construction sites in Korea using random forest model,

Safety Science,

Volume 120,

2019,

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https://doi.org/10.1016/j.ssci.2019.06.034.

(https://www.sciencedirect.com/science/article/pii/S0925753519301110)

Abstract: Although industrial accident rates are gradually decreasing in Korea, the construction industry's accident rate is still higher compared with other industries. Human errors, mentally unstable workers, insufficient safety training, and safety policy affect the occurrence of construction accidents. Owing to the characteristics of this industry, occupational accident types, such as fall from height, collision with objects, rollover, and those due to falling objects, can be related to the weather data. Therefore, to reduce and prevent occupational injury, it is necessary to classify and predict occupational accident types in detail. In this study, we built a model to

classify and predict occupational accident types using a random forest (RF). We extracted important factors that affect the occupational accident types at construction sites using feature importance, and we analyzed the relationship between these factors and occupational accident types. The accuracy score of the RF model was obtained as 71.3%, and we presented key construction safety factors considering the feature importance. For future research, we will collect data and develop models to predict occupational accident types in real-time. Real-time construction accident prediction research will reduce accident at construction sites.

Keywords: Construction safety; Occupational accident types; Machine learning; Random forest; Feature importance; Data analysis

Yao Chang Wu, Bin Laiwang, Chi Min Shu,

Process loss prevention of petrochemical process: A case study of the flashing accident of the storage tank on acrylonitrile-butadiene-styrene powder in Taiwan,

Journal of Loss Prevention in the Process Industries,

Volume 69,

2021,

104371,

ISSN 0950-4230,

https://doi.org/10.1016/j.jlp.2020.104371.

(https://www.sciencedirect.com/science/article/pii/S0950423020306586)

Abstract: Qualitative analysis, process hazard analysis, thermal evaluation, and fault tree analysis were applied to a flashing accident involving a storage tank that contained acrylonitrile-butadiene-styrene (ABS) powder in Taiwan. The accident was caused by combustible powder attached to the inner wall of the tank reaching a high temperature and then melting. Thereafter,

the molten powder became glue-like and dropped onto the ABS powder, burning at the tank bottom, causing decomposition of the styrene and butadiene derivatives as well as other combustible gases. The high concentration of combustible powder and low ignition temperature triggered the powder, initiating a dust explosion. Finally, we analyzed the findings of each method and examined the properties of ABS powder, realizing that the root cause of the accident included an insufficient understanding of the characteristics of ABS and the failure to comply with the management procedures of hot work. Recommendations and countermeasures were proposed that could proactively ameliorate process safety.

Keywords: Process hazard; Fault tree analysis; Acrylonitrile-butadiene-styrene; Dust explosion; Process safety

Elena Stefana, Filippo Marciano, Daniel Drolet, Thomas W. Armstrong,

A traditional Near Field-Far Field approach-based model and a spreadsheet workbook to manage Oxygen Deficiency Hazard,

Process Safety and Environmental Protection,

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2021,

Pages 537-556,

ISSN 0957-5820,

https://doi.org/10.1016/j.psep.2020.11.014.

(https://www.sciencedirect.com/science/article/pii/S0957582020318735)

Abstract: Oxygen Deficiency Hazard (ODH) poses a serious occupational risk, and represents a frequent cause of incidents, accidents, and fatalities, mostly in confined spaces and laboratories. Besides these working environments, there is a large spectrum of industries that need to manage

the asphyxiation risk caused by extensive inert gas uses. In such a context, mathematical models represent a valuable tool for characterising exposure profiles under varying conditions and evaluating several exposure scenarios, prospectively or retrospectively, for new processes and/or non-routine events. To this end, the objectives of this paper are to: (1) define a traditional Near Field-Far Field (NF-FF) model to estimate the indoor oxygen (O2) concentration percent by volume and partial pressure, and (2) develop a spreadsheet workbook, called ODHMOD, for supporting occupational hygienists, safety and health practitioners, and risk assessors during ODH assessments. Both the NF-FF model and ODHMOD employ data and information usually available in companies, and predict the O2 levels time trends in working environments where inert gas releases can occur, and forced and natural ventilation can move airflows inside and/or outside. The mathematical model and its implementation in Microsoft® Excel are described, with an example of its application in a possible industrial scenario.

Keywords: Exposure assessment; Two-zone; Mathematical model; Indoor air model; Inert asphyxiant gas; Occupational safety and health

Meng Xiu, Xianyu Wang, Lidia Morawska, David Pass, Andrew Beecroft, Jochen F. Mueller, Phong Thai,
Emissions of particulate matters, volatile organic compounds and polycyclic aromatic hydrocarbons from warm and hot asphalt mixes,
Journal of Cleaner Production,
Volume 275,
2020,
123094,
ISSN 0959-6526,

https://doi.org/10.1016/j.jclepro.2020.123094.
(https://www.sciencedirect.com/science/article/pii/S0959652620331395)

Abstract: Emissions of hazardous organic chemicals from crumb rubber modified (CRM) asphalt mixes have been longstanding environmental and occupational health concerns. This study aimed to quantify the emissions of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and total suspended particles (TSP) from CRM and polymer asphalt mixes. Occupational exposure, during paving construction activities, to particulate matter (PM) in different size was also evaluated for pavement workers by a personal exposure monitoring approach. Overall, chamber test results showed that CRM hot mix asphalt (C-HMA) emitted higher levels of VOCs and PAHs than CRM warm mix asphalt (C-WMA), whereas C-WMA emitted a higher level of TSP. Lighter PAHs dominated the emitted ∑12 PAHs in both C-HMA and C-WMA, but compositions of VOCs varied greatly between asphalt groups. The emission factors for TSP and PAHs were 110 and 2.6 μg/kg asphalt for C-HMA, and 260 and 1.3 μg/kg asphalt for C-WMA, respectively. In addition, personal exposure level of PM was overall below the exposure guideline for asphalt fumes. The results from this study are expected to contribute to a comprehensive risk assessment of using ground tyre rubber techniques in road paving industries.

Keywords: Asphalt; Crumb rubber; Total suspended particles; Volatile organic compounds and polycyclic aromatic hydrocarbons

Kerim Koc, Asli Pelin Gurgun,

Scenario-based automated data preprocessing to predict severity of construction accidents,

Automation in Construction,

Volume 140,

2022,

104351,

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https://doi.org/10.1016/j.autcon.2022.104351.

(https://www.sciencedirect.com/science/article/pii/S0926580522002242)

Abstract: Occupational accidents are common in the construction industry, therefore developing prediction models to detect high severe accidents would be useful. However, existing studies are limited and usually focus on selecting the most appropriate machine learning method rather than identifying the most effective preprocessing pipeline before the prediction. In this study, a scenario-basis automated preprocessing model that identifies the best scenario is developed to predict the severity of construction accidents. The results show that the scenario combination of not removing missing data, not applying data binning, considering outliers, applying Min-Max-Scaler and one-hot encoding, and data resampling with random oversampling yielded the highest prediction performance with 0.6092 of F1-score. Permutation importance of XGBoost analysis indicates that year, cause material, age, past accidents, experience, and salary are the most influential attributes. This study contributes to society/practice through a model preventing high-severe accidents and theory/technology with novel preprocessing model to perform more reliable predictions.

Keywords: Automated pre-processing; Accident risk assessment; Occupational health and safety (OHS); Accident severity; Machine learning; Artificial intelligence; eXtreme gradient boosting (XGBoost)

Kristie L Ebi, Anthony Capon, Peter Berry, Carolyn Broderick, Richard de Dear, George Havenith, Yasushi Honda, R Sari Kovats, Wei Ma, Arunima Malik, Nathan B Morris, Lars Nybo, Sonia I Seneviratne, Jennifer Vanos, Ollie Jay,

Hot weather and heat extremes: health risks,

The Lancet,

Volume 398, Issue 10301,

2021,

Pages 698-708,

ISSN 0140-6736,

https://doi.org/10.1016/S0140-6736(21)01208-3.

(https://www.sciencedirect.com/science/article/pii/S0140673621012083)

Abstract: Summary

Hot ambient conditions and associated heat stress can increase mortality and morbidity, as well as increase adverse pregnancy outcomes and negatively affect mental health. High heat stress can also reduce physical work capacity and motor-cognitive performances, with consequences for productivity, and increase the risk of occupational health problems. Almost half of the global population and more than 1 billion workers are exposed to high heat episodes and about a third of all exposed workers have negative health effects. However, excess deaths and many heat-related health risks are preventable, with appropriate heat action plans involving behavioural strategies and biophysical solutions. Extreme heat events are becoming permanent features of summer seasons worldwide, causing many excess deaths. Heat-related morbidity and mortality are projected to increase further as climate change progresses, with greater risk associated with higher degrees of global warming. Particularly in tropical regions, increased warming might mean that physiological limits related to heat tolerance (survival) will be reached regularly and

more often in coming decades. Climate change is interacting with other trends, such as population growth and ageing, urbanisation, and socioeconomic development, that can either exacerbate or ameliorate heat-related hazards. Urban temperatures are further enhanced by anthropogenic heat from vehicular transport and heat waste from buildings. Although there is some evidence of adaptation to increasing temperatures in high-income countries, projections of a hotter future suggest that without investment in research and risk management actions, heat-related morbidity and mortality are likely to increase.

Meshal A. Alhadhoud, Najla F. Alsiri,
The epidemiology of traumatic musculoskeletal injuries in Kuwait: Prevalence and associated risk factors,
Journal of Taibah University Medical Sciences,
Volume 17, Issue 4,
2022,
Pages 685-693,
ISSN 1658-3612,
https://doi.org/10.1016/j.jtumed.2022.01.006.
(https://www.sciencedirect.com/science/article/pii/S1658361222000300)

Abstract: Objectives

Epidemiological explorations of traumatic injuries are essential to provide benchmarks for future planning to address multidimensional challenges. The study aimed to describe the epidemiology of traumatic musculoskeletal injuries in Kuwait, including their prevalence and associated risk factors.

Methods

The Orthopedic Admission Database of a level II trauma center in Kuwait was retrospectively reviewed from January 2018 to February 2020. Traumatic fractures of the spine and upper and lower limbs were explored.

Results

The study included 564 patients with 788 traumatic injuries who were 33.0 (23.0) years of age (median and interquartile range): 78.0% were male, and 43% were Kuwaitis. Spinal fractures were the most prevalent injury, at 21.7%, followed by tibial fractures, at 11.3%, and ankle fractures, at 10.2%. Road traffic accidents were the leading mechanism of injury, at 37.9%, followed by falling over and falling from height, at 29.3% and 16.8%, respectively. Risk factors included injury mechanism, nationality, and age ($p < 0.05$). Road traffic accidents were at risk for sustaining spinal, scapular, clavicle, humeral, pelvic, hip, tibial, and fibular fractures; those for falling over were radial, ulnar, femoral, and patellar fractures; and those for falling from height were foot and ankle fractures. Kuwaitis were found to be at risk of spinal, humeral, pelvic and femoral fractures, whereas non-Kuwaitis were found to be at risk of scapular, shoulder, elbow, ulnar, radial, hip, patellar, tibial, fibular, foot, and ankle fractures. The age range of 19–49 years was associated with the highest risk for all fracture sites.

Conclusion

Epidemiological characteristics of traumatic injuries in Kuwait have been determined to guide preventive strategies and healthcare planning.

Keywords: Fractures; Lower limb; Prevalence; Spine; Upper limb

Andres Gonzalez-Cortes, Damien Burlet-Vienney, Yuvin Chinniah, Abdallah Ben Mosbah, Ali Bahloul, Capucine Ouellet,

Inherently Safer Design (ISD) solutions in confined spaces: Experts' practical feedback in Quebec, Canada,

Process Safety and Environmental Protection,

Volume 157,

2022,

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https://doi.org/10.1016/j.psep.2021.11.044.

(https://www.sciencedirect.com/science/article/pii/S0957582021006509)

Abstract: This paper aims to present solutions based on inherently safer design (ISD) principles to reduce the risks related to interventions in confined spaces and discuss their general applicability in a design situation or installations retrofit by exploring the client-designer relationship. A literature review on ISD solutions for confined spaces was followed by semi-structured interviews with 15 experts on confined space risk management in Quebec, Canada. The solutions based on the literature were confronted with experts' knowledge on the real-life conditions in confined space interventions. Our findings suggest that considering the entire confined space's life cycle in design is still very marginal (e.g., questioning the necessity to enter). As designers tend to replicate non intrinsically safe designs (e.g., inadequate entrances dimensions), end-users will then require retrofitting the structures over time, which usually costs more in the long term than implementing ISD solutions earlier. The notion of declassification of the confined space to eliminate confined spaces can give a false sense of safety. Its contribution to accident prevention depends on how end-users reduce inherent or task-induced risks as low as reasonably practicable. This paper categorized declassification into three types: total elimination, hazard-oriented declassification, and organizational declassification. Since the implementation

guidelines of these risk reduction strategies are absent in the literature, this paper provides a risk reduction model that shows how end-users can identify application phases, declassify a confined space, and manage residual risks at the design phase in real-life environments.

Keywords: Confined space; Declassification; Risk reduction; Inherently Safer Design; Accident prevention, Occupational health and safety

Jiaqi Li, Xuefeng Zhao, Guangyi Zhou, Mingyuan Zhang,

Standardized use inspection of workers' personal protective equipment based on deep learning,

Safety Science,

Volume 150,

2022,

105689,

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https://doi.org/10.1016/j.ssci.2022.105689.

(https://www.sciencedirect.com/science/article/pii/S0925753522000297)

Abstract: Falling from height (FFH) and object strike (OS) accidents frequently occur at construction sites, threatening personnel safety and affecting the construction quality. In the hierarchy of controls, personal protective equipment (PPE) is the most easily achievable measure. However, the presence of hazards and the differentiation in subjective protection awareness make PPE the least effective control measure. Therefore, it is necessary to promote proper and standardized use of PPE to meet the requirements from the perspective of administrative control. Taking two behaviors that can lead to OS and FFH accidents as a research case—loosening the hardhat and not using the safety harness's hook—this study proposes a deep-learning-based inspection method. First, we established a detection model for hardhats and hooks based on You

Only Look Once v5. Thereafter, the object-detection model and Openpose algorithm were applied to recognize 1200 video clips containing three unsafe behaviors and one safe behavior and generate 1200 data files that vary in a time series. Finally, a one-dimensional convolutional neural network (1D-CNN) model was trained with the data of 600 videos, and the model was used to test the data of the other 600 videos. The accuracy attained was 0.9467 in the experimental scenario. Using the proposed method, the improper use of PPE can be determined without affecting the normal behavior of individuals, which can improve the efficiency of safety management.

Keywords: Openpose; Object detection; Convolutional neural network; Deep learning; Fall prevention; Personnel protective equipment

Fu-Qiang Yang, Xin Li, Fanliang Ge, Gang Li,
Dust prevention and control in China: A systematic analysis of research trends using bibliometric analysis and Bayesian network,
Powder Technology,
Volume 411,
2022,
117941,
ISSN 0032-5910,
https://doi.org/10.1016/j.powtec.2022.117941.
(https://www.sciencedirect.com/science/article/pii/S0032591022008221)

Abstract: Along with the development of Chinese industry, dust control in the workplace has become an important issue. Dust not only endangers people's lives and occupational health, but also pollutes the environment, which hinders the construction and progress of clean and green

production in China. This paper collected 1186 Chinese dust control literature from web core databases for a review, spanning 30 years. A bibliometric approach was employed to analyze and discuss the content of the dust control field, covering literature releases, authors, institutions, journal source, citations, and keyword co-occurrence. Furthermore, Bayesian networks(BNs) predicted future hot topics (FHTs) in the field. The results showed that there were three stages of literature publication; Nie Wen was the author with the most publications in the domain of dust control in China; Shandong University of Science and Technology was the authoritative institution in the field; Powder technology the popular journal among Chinese dust control researchers. According to the keyword co-occurrence analysis, the area mainly contains dust types, dust control methods, dust explosion, numerical simulation, occupational diseases and dust pollution; Finally, environmental pollution, numerical simulation and coal mine dust control were considered as the FHTs.

Keywords: China; Dust control; Occupational health; Bibliometric; Bayesian network; Dust explosion

Fateme H. Abdolahi, Ali S. Variani, Sakineh Varmazyar,
Predicting Ability of Dynamic Balance in Construction Workers Based on Demographic Information and Anthropometric Dimensions,
Safety and Health at Work,
Volume 12, Issue 4,
2021,
Pages 511-516,
ISSN 2093-7911,
https://doi.org/10.1016/j.shaw.2021.07.009.

(https://www.sciencedirect.com/science/article/pii/S2093791121000627)

Abstract: Background

Difficulties in walking and balance are risk factors for falling. This study aimed to predict dynamic balance based on demographic information and anthropometric dimensions in construction workers.

Methods

This descriptive-analytical study was conducted on 114 construction workers in 2020. First, the construction workers were asked to complete the demographic questionnaire determined in order to be included in the study. Then anthropometric dimensions were measured. The dynamic balance of participants was also assessed using the Y Balance test kit. Dynamic balance prediction was performed based on demographic information and anthropometric dimensions using multiple linear regression with SPSS software version 25.

Results

The highest average normalized reach distances of YBT were in the anterior direction and were 92.23 ± 12.43% and 92.28 ± 9.26% for right and left foot, respectively. Both maximal and average normalized composite reach in the YBT in each leg were negatively correlated with leg length and navicular drop and positively correlated with the ratio of sitting height to leg length. In addition, multiple linear regressions showed that age, navicular drop, leg length, and foot surface could predict 23% of the variance in YBT average normalized composite reach of the right leg, and age, navicular drop, and leg length could predict 21% of that in the left leg among construction workers.

Conclusion

Approximately one-fifth of the variability in the normalized composite reach of dynamic balance reach among construction workers using method YBT can be predicted by variables age, navicular drop, leg length, and foot surface.

Keywords: Anthropometry; Construction; Dynamic; Worker; Balance

Jennifer D. Runkle, Can Cui, Chris Fuhrmann, Scott Stevens, Jeff Del Pinal, Margaret M. Sugg, Evaluation of wearable sensors for physiologic monitoring of individually experienced temperatures in outdoor workers in southeastern U.S.,

Environment International,

Volume 129,

2019,

Pages 229-238,

ISSN 0160-4120,

https://doi.org/10.1016/j.envint.2019.05.026.

(https://www.sciencedirect.com/science/article/pii/S0160412018329799)

Abstract: Climate-related increases in global mean temperature and the intensification of heat waves present a significant threat to outdoor workers. Limited research has been completed to assess the potential differences in heat exposures that exist between individuals within similar microenvironments. Yet, there is a paucity of individual data characterizing patterns of individually experienced temperatures in workers and the associated physiologic heat strain response. The objective of this study was to apply a wearable sensor-based approach to examine the occupational, environmental, and behavioral factors that contribute to individual-level variations in heat strain in grounds maintenance workers. Outdoor workers from three diverse climatic locations in the southeastern United States – high temperature, high temperature + high

humidity, and moderate temperature environments – participated in personal heat exposure monitoring during a 5-day work period in the summer. We performed Cox proportional hazards modeling to estimate associations between multiple heat strain events per worker and changes in individually experienced temperatures. Heat strain risk was higher among workers with a place to cool-off, higher education, and who worked in hotter temperatures. A mismatch was observed between workers' perceptions of heat strain and actual heat strain prevalence across exposure groups. We also used a quasi-Poisson regression with distributed lag non-linear function to estimate the non-linear and lag effects of individually experienced temperatures on risk of heat strain. The association between increasing temperature and heat strain was nonlinear and exhibited an U-shaped relationship. Heat strain was less common during issued heat warnings demonstrating behavioral adaptive actions taken by workers. This study is one of the first temperature monitoring studies to quantify the individual-level exposure-response function in this vulnerable population and highlights the elevated risk of heat strain both immediately and several days after worker exposure to high temperatures.

Keywords: Climate change risk assessment; Individually experienced temperatures; Outdoor workers; Wearable sensors; Distributed lag nonlinear models; Physiologic heat strain

J.P. Edwards, B. Kuhn-Sherlock,

Opportunities for improving the safety of dairy parlor workers,

Journal of Dairy Science,

Volume 104, Issue 1,

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Pages 419-430,

ISSN 0022-0302,

https://doi.org/10.3168/jds.2020-18954.

(https://www.sciencedirect.com/science/article/pii/S0022030220309541)

Abstract: ABSTRACT

One aspect of a successful dairy business is attracting and retaining skilled staff. The ability to do this is influenced by workplace attractiveness, one aspect of which is worker comfort and safety. Working with heavy machinery and animals makes dairy farming a dangerous occupation relative to many other sectors. Milking is the most time-consuming task on pasture-based dairy farms, and the parlor is the logical site of a number of injuries, although little is known about their causes or their relationship to parlor design and management. To investigate worker safety further, we conducted an on-farm survey on New Zealand dairy farms between December 2018 and March 2019. The survey had 3 objectives: to identify common causes of injuries relating to milking; to describe variations in milking parlor design and management practices on dairy farms; and to identify management and parlor factors that contribute to milking injuries. Analysis of accident compensation data from the state-run accident insurer for a 5-yr period from July 2013 to June 2018 was a fourth objective. Accident claims identified as related to milking through a key word search averaged NZ$252 (NZ$1 was equivalent to US$0.60 on May 19, 2020) per claim for non-severe injuries and NZ$9,334 per claim for severe injuries, for a total of NZ$1.95 million per year. A total of 136 injuries were reported on 99 of the 560 farms surveyed, and accident insurance claims were made for 53 of these injuries. The survey found that 48% of injuries occurred while workers were attaching clusters: typically soft-tissue and fracture injuries to fingers, hands, wrists, and arms. Injuries to these body parts represented the greatest cost (51% of the annual insurance cost) and identified safe cluster attachment as an area of focus for reducing milking injuries. Potential low-cost solutions include improved cluster design and a hand–arm guard. We identified a clear seasonal trend that coincided with busy periods in a

seasonal block calving system, suggesting that options to reduce fatigue in spring may be beneficial; however, the number of hours worked or number of consecutive days worked were not associated with the number of milking injuries. Those aged 20–29 yr had more injuries relative to their proportion of the workforce, indicating that more training may be beneficial (e.g., setting ergonomic milking routines). Female workers were at greater risk of injury than males; this finding may have been related to the height of the animal relative to the height of the milker.
Keywords: milking; injury; health and safety; cluster attachment

Jason Selman, Jeffrey Spickett, Janis Jansz, Benjamin Mullins,
An investigation into the rate and mechanism of incident of work-related confined space fatalities,
Safety Science,
Volume 109,
2018,
Pages 333-343,
ISSN 0925-7535,
https://doi.org/10.1016/j.ssci.2018.06.014.
(https://www.sciencedirect.com/science/article/pii/S0925753517319574)
Abstract: Confined spaces are defined by a particular set of hazards which include oxygen deficiency, toxic airborne contaminants, flammable atmospheres, the risk of engulfment in free-flowing solids and liquids, and physical hazards such as working at heights, electricity, and moving parts and machinery. This study conducted an analysis of work-related traumatic fatal injuries involving confined spaces and compared the rate of confined space fatalities in the working population between similar industrialised countries; the rate of confined space entrant to

confined space rescuer deaths; and identified the difference in the mechanism of incident between entrant and rescuer deaths. The confined space fatality rate can be estimated to vary between 0.05 and 0.08 deaths per 100,000 workers, of which no more than 17% were found to be those undertaking rescue; with most of these deaths the result of hurried and ad hoc rescue attempts. While the major causes of death among entrants were toxic atmospheric hazards and physical hazards; confined space rescuer deaths were overwhelmingly as a result of toxic atmospheres. It is likely that these figures are an underestimate of all confined space fatalities, as government WHS authorities rarely identify such incidents as having occurred in a confined space. The inclusion of engulfment and other physical hazards of confined space work in safety legislation, and the separate identification of confined space incidents will permit better analysis and recommendations for confined space work safety improvements.

Keywords: Fatality; Confined space; Mechanism of incident; Rescue

Diana van Doorn, Noel Richardson, David Meredith, Catherine Blake, John McNamara,
Study protocol: Evaluation of the ‘real-world’ Farmers Have Hearts – Cardiovascular Health Program,
Preventive Medicine Reports,
Volume 30,
2022,
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https://doi.org/10.1016/j.pmedr.2022.102010.
(https://www.sciencedirect.com/science/article/pii/S2211335522003175)

Abstract: Premature cardiovascular disease (CVD) mortality among men represents a public health concern worldwide. In Ireland, male farmers are a ‘high-risk’ group for CVD mortality compared to normative values for Irish males. Despite this, they are perceived to be a ‘hard-to-reach’ (HTR) group to engage with health interventions. Primary prevention measures, including health screening and health behavior change interventions, are key strategies in addressing CVD yet often do not reach HTR groups such as male farmers. The Farmers Have Hearts – Cardiovascular Health Program (FHH-CHP) is a unique large-scale (n = 868) workplace health intervention specifically targeted at Irish male livestock farmers. It included a baseline and Week 52 health check and a health behavior change intervention with three delivery methods: ‘health coach by phone’ and/or mobile (M)-health by text message. The program adopted gender-specific and strengths-based methods to maximize participant engagement. It integrated a multi-actor approach and was trialed in a ‘real world’ practice outside of confined health care settings. Data collection comprised health check results (baseline, Week 52) and self-report measures (baseline, Week 26, Week 52). The FHH-CHP is the first targeted health intervention adopting gender-specific methods to reach and engage male livestock farmers in their cardiovascular health. Documenting the FHH-CHP study protocol is important therefore and will benefit practitioners attempting to apply gender-specific approaches to engage at-risk and HTR groups of men with targeted health interventions. Meeting men outside of clinical health settings and adopting gender competency standards are needed to address inequities in health outcomes experienced by men.
Keywords: Gender-specific methodology; ‘hard-to-reach’ population group; Farmers; ‘Real world’ trial; Health behavior change intervention; Study protocol

Yang Geng, Lingying Zhao, S. Dee Jepsen,

Designing a grain dust simulator for dusty environments in typical grain bins in the Midwestern United States,

Biosystems Engineering,

Volume 220,

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Pages 203-213,

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https://doi.org/10.1016/j.biosystemseng.2022.05.020.

(https://www.sciencedirect.com/science/article/pii/S1537511022001325)

Abstract: Grain dust represents a significant health risk to grain farmers and workers. Exposure to grain dust can diminish lung function as well as cause respiratory diseases. Grain storage facilities are considered agricultural confined spaces with high concentrations of grain dust. On-farm research for dust sample measurements is time consuming and cost prohibitive. The objective of this research was to design, build, and test a grain dust simulator (GDS) to simulate the dusty environments of grain storage bins in a laboratory setting whereby different types of grain dusts with various environmental conditions (airflow, temperature, and humidity) could be studied. The GDS, a 1/10th scale bin model, was designed with similar ventilation and auger systems as an on-farm grain bin with a diameter of 15.24 m and a capacity of 1762 m3. Dust concentration data collected from farms in Ohio, USA were used to guide the development of the GDS. Feasibility and performance tests verified that the GDS designed can be used as a testing platform for simulating the dusty environment in grain bins and development of effective respiratory protection for farmers under various on-farm conditions.

Keywords: Grain Bin; Dusty Environment; Dust Exposure; Grain Dust Simulator; Agricultural Health

Li Xiaochuan, Zhang Mingrui, Jiang Yefeng, Wang Li, Zhao Xinli, Chang Xi, Bai Haoyu, Deng Xianming,

Air curtain dust-collecting technology: Investigation of factors affecting dust control performance of air curtains in the developed transshipment system for soybean clearance based on numerical simulation,

Powder Technology,

Volume 396, Part A,

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https://doi.org/10.1016/j.powtec.2021.10.018.

(https://www.sciencedirect.com/science/article/pii/S0032591021008998)

Abstract: Transshipment of compacted soybean is characterized by labor-intensive processes, long operating times, and a great amount of dust that cannot be collected by sealed devices. This dust significantly reduces air quality of the workshop and represents a great threat to human health. Solving this problem has been a great challenge in the soybean storage industry. For this reason, in the present study the concept of a transshipment system for soybean clearance was proposed. This system can simultaneously achieve real-time transshipment of falling materials and air curtain control of fugitive dust. The main factors influencing the performance of the air curtain dust control system were investigated using numerical simulation, and the effects of the exhaust-to-pressure ratio K and air curtain outlet velocity V on dust control efficiency were determined. Results showed that the width of the dust-collecting paths increased with increasing K and V values. We also found out that dust-escape paths were mainly concentrated in the

transition height between the complete air curtains and local air curtains. At the beginning of the process, dust control efficiency rapidly increased and the increment rate became slower as K increased. When K = 1.5 and V = 5–6 m/s, dust control efficiency reached values up to 95.54–96.27%. Based on numerical simulation results, the prototype transshipment system for soybean clearance was developed, and the effectiveness of air curtain dust control was validated via smoke tracing experiments. After the application of the developed system, occupational lung disease can be significantly reduced, and transshipment efficiency per clearance can be enhanced by approximately 67% (about 50,113 ¥ can be saved in terms of energy consumption and labor resources). An extra granary can be saved after using the newly developed system for 36.5–52.1 clearances.

Keywords: Transshipment system for soybean clearance; Optimization of air curtain parameters; Dust control efficiency; Numerical simulation

Ángel Arturo López-González, María Albaladejo-Blanco, Sebastiana Arroyo-Bote, J. Ignacio Ramírez-Manent, Nora López-Safont, Estefanía García-Ruiz, María Teófila Vicente-Herrero, Cardiovascular risk and associated risk factors in Spanish professional drivers,
Journal of Transport & Health,
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101266,
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https://doi.org/10.1016/j.jth.2021.101266.
(https://www.sciencedirect.com/science/article/pii/S2214140521002966)

Abstract: Introduction

Cardiovascular diseases are the leading cause of mortality worldwide and are related to harmful lifestyles and certain professions such as being a professional driver. The aim of this study was to determine cardiovascular risk in professional drivers and the factors that influence it, with the intention of recommending improvements in their lifestyle habits.

Material and methods

A retrospective, cross-sectional study was carried out on 24784 professional drivers (cab drivers and bus drivers) of both sexes (23,560 men and 1227 women) in different Spanish regions. Several variables and scales related to cardiovascular risk were assessed. In order to see if this type of profession produces an increase in cardiovascular risk.

Results

27.8% of drivers were obese, 34.7% were hypertensive, and 48.7% had a high waist to height ratio. 46.5% were considered non-metabolically healthy, in that 24.9% had metabolic syndrome with the NCEP-ATPIII criteria, 19.2% with the IDF criteria, and 37.3% with JIS criteria. 26.9% had moderate or high values on the REGICOR scale and 29.5% on the SCORE scale. 32.7% had a high risk of hepatic steatosis.

Conclusions

The cardiovascular risk of our drivers was high in men and moderate in women. Significant differences were found between men and women with regard to the habits of regular physical exercise and healthy eating, which could justify the lower cardiovascular risk in women.

Keywords: Cardiovascular risk; Professional drivers; Sociodemographic variables; Healthy habits

Bhavani Shankara Bagepally, Joydeep Majumder, Sanjay Kotadiya,

Association between the 2d:4d and cardiovascular risk factors: Body mass index, blood pressure and body fat,

Early Human Development,

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105193,

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https://doi.org/10.1016/j.earlhumdev.2020.105193.

(https://www.sciencedirect.com/science/article/pii/S0378378220305594)

Abstract: Objectives

To examine the relationship between the cardiovascular risk factors such as obesity as measured by Body mass index (BMI), body fat and blood pressure with the second to fourth digit ratio (2d:4d); a prenatal testosterone exposure marker.

Methods

The 2d:4d for both hands were measured for the Indian male subjects' (n = 1217). Subject's anthropometric parameters such as height, weight, skinfold thicknesses at various regions and blood pressure measurements were collected in a cross-sectional study with a convenient sampling approach. The association between digit ratio and the other variables were examined using analysis of variance, Pearson's correlation test and linear regression methods.

Results

The study included 1193 subjects and all were males aged 19.69 ± 5.38 years (range 13 to 40 years). The subjects' body mass index (BMI) was 19.45 ± 3.82 and right and left hand 2d:4d were 0.958 ± 0.054, and 0.958 ± 0.061 respectively. The systolic blood pressure (SBP) and BMI significantly differed between the higher and lower half of right 2d:4d. The left hand 2d:4d was

significantly correlated with SBP ($r = 0.075$, $p = 0.028$) and significantly differed between different hypertensive groups ($p < 0.003$, $F = 3.552$, $df = 5$).

Conclusion

The study observed an association between 2d:4d with hypertension and BMI among young Indian population, emphasizing the effect of prenatal testosterone on late life cardiovascular risk factor.

Keywords: 2d:4d; BP, BMI; Myocardial infarction; Skinfold thickness

Runming Yao, Yongqiang Li, Chenqiu Du, Baizhan Li,

A ‘heart rate’-based model (PHSHR) for predicting personal heat stress in dynamic working environments,

Building and Environment,

Volume 135,

2018,

Pages 318-329,

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https://doi.org/10.1016/j.buildenv.2018.03.014.

(https://www.sciencedirect.com/science/article/pii/S0360132318301434)

Abstract: The parameter of human body metabolic rates has been popularly used for the prediction of human heat stress in hot environments. However, most modules use the fixed and estimated metabolic heat production. The aim of this study is to develop the prediction of personal heat stress in dynamic working environments. Based on the framework of the predicted heat stress (PHS) model in ISO 7933, a heart rate-based PHSHR model has been developed using the time-based heart rate index, which is suitable for prediction in situations where metabolic

rates are dynamic and there are inter-individual variations. The infinitesimal time unit Δti, has been introduced into the new PHSHR model and all the terms used in the PHS model related to metabolic rates are thus redefined as the function of real-time heart rates. The PHSHR has been validated under 8 experimental combined temperature-humidity conditions in a well-controlled climate chamber. The feature of the PHSHR model is being able to calculate dynamic changes in body metabolism with exposure time. It will be useful to the identification of potential risks of individual workers so to establish an occupational working environment health and safety protection mechanism by means of simultaneous monitoring of workers' heart rates at the personal levels, using advanced sensor technology.

Keywords: Heat stress; PHS model; Metabolic rate; Heart rate; Infinitesimal time

Kwangseok Choi, Yuki Osada, Yuta Endo, Teruo Suzuki,

Experimental study on the effect of metal protrusions inside silos on electrostatic discharges,

Powder Technology,

Volume 366,

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Pages 661-666,

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https://doi.org/10.1016/j.powtec.2020.02.076.

(https://www.sciencedirect.com/science/article/pii/S0032591020301832)

Abstract: This paper experimentally introduces the electrostatic discharges generated from metal protrusions inside a silo during the loading of powders. An industrial-scale pneumatic powder transport facility including a silo and approximately 400 kg of polypropylene powder (PP, 2–3 mm in size) were used for this test. The PP powder loading speed was approximately 0.38 kg/s.

Six different diameters (D: 1 cm to 6.3 cm) of metal protrusions were used. The metal protrusions were attached to the silo wall using a 30 cm support rod that was electrically grounded. The height from the accumulated PP powder to the protrusion in the silo varied from 10 cm to 50 cm. An image-intensifier unit was used in order to observe the electrostatic discharges generated from the metal protrusions and a current probe attached to an oscilloscope was used in order to measure the current of the discharges. As for the results, electrostatic discharges (such as brush discharges) from protrusions during the loading of PP powders were clearly observed. Specifically, the electrostatic discharge was the strongest in this paper when the diameter of the protrusion was 4 cm and the height from the accumulated powder was 30 cm. As an important finding, the value of the discharge amount was affected to a greater extent by the maximum discharge current. The maximum charge amount of electrostatic discharges generating from the metal protrusions in all of the test conditions was −122 nC, which is twice as high as the threshold for electrostatic risk assessment in the liquid painting process. These results suggest that, in the chemical process, sensitive powders with MIEs of less than 4 mJ, powders wetted with solvents, and the solvents themselves must be carefully handled, as these kinds of powders may be ignited by brush discharges. In order to prevent and reduce electrostatic accidents, it is important to make sure that no external material enters the silo.

Keywords: Electrostatic discharges; Silo; Protrusions; Powder; Polypropylene

Qi Fang, Heng Li, Xiaochun Luo, Lieyun Ding, Hanbin Luo, Chengqian Li,
Computer vision aided inspection on falling prevention measures for steeplejacks in an aerial environment,
Automation in Construction,
Volume 93,

2018,

Pages 148-164,

ISSN 0926-5805,

https://doi.org/10.1016/j.autcon.2018.05.022.

(https://www.sciencedirect.com/science/article/pii/S0926580517310804)

Abstract: Falling from height accidents are a major cause of fatalities on construction sites. Despite a lot of research conducted on the enhancement of safety training and removal of hazardous areas, falling accidents remain a major threat for steeplejacks. According to NOISH FACE reports, 75.1% of the fall from height decedents didn't use the Personal Fall Arrest Systems (PFAS), which shows insufficient supervision of the use of Personal Protective Equipment (PPE) by steeplejacks. Few scholars consider PFAS an important measure to prevent falls and the existing studies on PPE inspections showed that they were unsuitable for the scenarios faced by steeplejacks. This paper proposes an automated inspection method to check PPEs' usage by steeplejacks who are ready for aerial work beside exterior walls. An aerial operation scenario understanding method is proposed, which makes the inspection a preventative control measure and highly robust to noise. A deep-learning based occlusion mitigation method for PPE checking is introduced. We tested the performance of our method under various conditions and the experimental results demonstrate the reliability and robustness of our method to inspect falling prevention measures for steeplejacks and can help facilitate safety supervision.

Keywords: Fall prevention; PPE; Automated monitoring; Computer vision; Deep learning

Edward W. Ansah, Emmanuel Ankomah-Appiah, Mustapha Amoadu, Jacob O. Sarfo,

Climate change, health and safety of workers in developing economies: A scoping review,

The Journal of Climate Change and Health,

Volume 3,

2021,

100034,

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https://doi.org/10.1016/j.joclim.2021.100034.

(https://www.sciencedirect.com/science/article/pii/S2667278221000316)

Abstract: Climate change poses a threat to human survival, and global efforts are necessary to combat rising temperatures and the effects of climate change on human health. Developing countries with a large informal sector workforce and highly physical jobs frequently carried out under hot temperatures with inadequate safety regulations may see greater effects of climate change on human health. This scoping review was conducted to examine the impact of climate change on the occupational health and safety of workers in developing economies. Two main databases, PubMed and ScienceDirect, and other literature sources were consulted to find appropriate articles on climate change and its associated health and safety effects on workers in developing countries. Terms such as ‘climate change’, ‘global warming’, ‘ambient heat’, ‘sun heat’, ‘occupational health and safety’, ‘health’, ‘occupational illness’, ‘workers’, ‘developing countries’ and ‘low- and middle-income countries’ were among the search items. Five hundred and fourteen (514) records were identified. After screening and removing duplicates, 67 full text articles were assessed for eligibility and 34 were included in this review. Included articles (excluding literature reviews) sampled 24,736 participants. The evidence in this scoping review shows a link between climate change and injuries, fatigue, exhaustion, psychological stress, cardiovascular and respiratory issues, chronic illnesses including cancer and kidney diseases and in extreme cases, death to workers. This study provides information that will help developing

economies prioritize cutting edge research, occupational health and safety, policies, campaigns and interventions that protect the ecosystem and their workforce.

Keywords: Climate change; Occupational health; Developing countries; Workers

Shuai Yin, Wen Nie, Lidian Guo, Qiang Liu, Yun Hua, Xiaojiao Cai, Lei Cheng, Bo Yang, Wenjie Zhou,

CFD simulations of air curtain dust removal effect by ventilation parameters during tunneling,

Advanced Powder Technology,

Volume 31, Issue 6,

2020,

Pages 2456-2468,

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https://doi.org/10.1016/j.apt.2020.04.008.

(https://www.sciencedirect.com/science/article/pii/S092188312030159X)

Abstract: During coal mining, the fully-mechanized tunnel is always under high-concentration of dust pollution. This brings not only the potential risk of dust explosion but also makes the tunnel workers suffer from coal mine pneumoconiosis (CWP), a systemic disease featured by pulmonary fibrosis. Therefore, it is extremely important to establish a theory and optimal parameters for dust control over fully-mechanized excavating tunnels. In this study, we analyzed the dust diffusion under several parameters, including the distance between the forced air opening and the cutting face (LY), the height of the forced air cylinder above the floor (LH), and the distance between the center of the forced air cylinder and the nearest coal wall (LJ). The optimal dust control parameters were determined as: LY = 20 m, LH = 3 m and LJ = 0.6 m. Under this condition, the airflow can effectively suppress the diffusion of dust particles. At the same time,

the operating environment of the roadheader driver was remarkably improved and the requirements on miners' occupational health and safe production were satisfied. The present study proposed a new approach for occupational health of the workers in the excavating tunnel and clean production management.

Keywords: CFD simulation; Occupational health; Tunneling; Air curtain dust control; Field measurement

Ratchaneegorn Mapanao, Tidawadee Rangabpai, Yu-Ru Lee, Hsin-Wei Kuo, Winton Cheng, The effect of banana blossom on growth performance, immune response, disease resistance, and anti-hypothermal stress of Macrobrachium rosenbergii,

Fish & Shellfish Immunology,

Volume 124,

2022,

Pages 82-91,

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https://doi.org/10.1016/j.fsi.2022.03.041.

(https://www.sciencedirect.com/science/article/pii/S105046482200167X)

Abstract: Banana (Musa acuminata) blossom contains high nutritional value and bioactive compounds. In this study, Macrobrachium rosenbergii were fed with diets containing banana blossom powder (BBP) at 10 and 20 g kg−1, hot-banana blossom (BBH) extract at 10 and 20 g kg−1, and the basal diet for 56 days. The growth performance, physiological response and immune parameters were evaluated. The results showed that a significantly higher percentage weight gain (PWG) and percentage length gain (PLG) in prawns fed with BBH diet. The feed efficiency (FE) significantly increased in prawns fed BBP. The prawn fed both BBH and BBP

diet showed higher survival rate than control group. The prawn fed with BBH showed a significant increase in total haemocyte count (THC) and different haemocyte count (DHC), whereas phenoloxidase (PO) activity and respiratory bursts (RBs) significant increase in prawns fed both BBP and BBH diet. Furthermore, M. rosenbergii fed with both BBP and BBH diets showed significantly higher phagocytic activity and clearance efficiency against Lactococcus garvieae infection. At the end of the 56 days of feeding trial, the susceptibility of prawns to L. garvieae infection and hypothermal (18 °C) stress were evaluated. The results showed that prawns fed BBH diets had a significantly higher survival rate against L. garvieae than those of fed with the basal diet. Anti-hypothermal stress was observed in prawns fed both BBP and BBH diets showing no significant difference in haemolymph glucose in prawns subjected to 18 °C and 28 °C, whereas the norepinephrine level in haemolymph of prawns fed with BBH diets subjected to 18 °C was significantly lower than in prawns subjected to 28 °C. In summary, we recommend addition of hot-banana blossom extract to the diet of M. rosenbergii at 20 g kg−1 to promote growth performance, improve physiological function, enhance immunity, increase anti-hypothermal stress, and to increase resistance against L. gavieae.

Keywords: Macrobrachium rosenbergii; Banana blossom; Bioactive compound; Immunity; Anti-hypotermal stress; Disease resistance

Aikelaimu Aihemaiti, Yuchen Gao, Yuan Meng, Xuejing Chen, Jiwei Liu, Honglin Xiang, Yiwen Xu, Jianguo Jiang,
Review of plant-vanadium physiological interactions, bioaccumulation, and bioremediation of vanadium-contaminated sites,
Science of The Total Environment,
Volume 712,

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135637,

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https://doi.org/10.1016/j.scitotenv.2019.135637.

(https://www.sciencedirect.com/science/article/pii/S0048969719356323)

Abstract: Vanadium is a multivalent redox-sensitive metal that is widely distributed in the environment. Low levels of vanadium elevate plant height, root length, and biomass production due to enhanced chlorophyll biosynthesis, seed germination, essential element uptake, and nitrogen assimilation and utilization. However, high vanadium concentrations disrupt energy metabolism and matter cycling; inhibit key enzymes mediating energy production, protein synthesis, ion transportation, and other important physiological processes; and lead to growth retardation, root and shoot abnormalities, and even death of plants. The threshold level of toxicity is highly plant species-specific, and in most cases, the half maximal effective concentration (EC50) of vanadium for plants grown under hydroponic conditions and in soil varies from 1 to 50 mg/L, and from 18 to 510 mg/kg, respectively. Plants such as Chinese green mustard, chickpea, and bunny cactus could accumulate high concentrations of vanadium in their tissues, and thus are suitable for decontaminating and reclaiming of vanadium-polluted soils on a large scale. Soil pH, organic matter, and the contents of iron and aluminum (hydr)oxides, phosphorus, calcium, and other coexisting elements affect the bioavailability, toxicity, and plant uptake of vanadium. Mediation of these conditions or properties in vanadium-contaminated soils could improve plant tolerance, accumulation, or exclusion, thereby enhancing phytoremediation efficiency. Phytoremediation with the assistance of soil amendments and microorganisms is a promising method for decontamination of vanadium polluted soils.

Keywords: Vanadium; Plant physiology; Bioremediation; Bioaccumulation; Tolerance

Jacqueline M.K. Wong, Kristin J. Moore, Erin T. Carey,

Investigation of the Association between Surgeon Sex and Laparoscopic Device Ergonomic Strain in Gynecologic Surgery,

Journal of Minimally Invasive Gynecology,

Volume 29, Issue 8,

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Pages 984-991,

ISSN 1553-4650,

https://doi.org/10.1016/j.jmig.2022.04.019.

(https://www.sciencedirect.com/science/article/pii/S1553465022001698)

Abstract: ABSTRACT

Study Objective

To assess whether female compared with male sex is associated with greater ergonomic strain with the use of 4 advanced energy laparoscopic devices (LigaSure, HALO PKS, ENSEAL, and Harmonic scalpel).

Design

Online survey distributed by e-mail using the REDCap platform (Vanderbilt University). All responses were anonymous.

Setting

Nationwide survey in the United States.

Participants

Gynecologic surgeons were surveyed through the Society of Gynecologic Surgeons listserv and 4 obstetrics and gynecology departmental listservs.

Interventions

The survey was distributed between May 1, 2020, and November 1, 2020. The primary outcome was the presence of physical complaints owing to laparoscopic devices. Descriptive statistics compared surgeon characteristics and ergonomic symptoms. Logistic regression was performed, adjusted for surgeon characteristics.

Measurements and Main Results

The response rate was 39%, comprising 149 women (78%) and 41 men (22%). Women compared with men had a significantly younger age (mean, 34 vs 44 years; $p < .01$), had smaller glove size (mean, 6.5 vs 7.5; $p < .01$), had shorter height (median, 66 vs 71 inches; $p < .01$), and were less frequently in practice for >10 years (19% vs 49%; $p < .01$). Women significantly more often reported physical complaints related to the use of laparoscopic devices (79% vs 41%; $p < .01$). Women reported that all devices had too large a fit for appropriate use ($p < .01$). Women were found to have 5.37 times the odds of physical complaints attributed to the use of laparoscopic instruments (crude oods ratio, 5.37; 95% confidence interval, 2.56–11.25); with adjustment for glove size, age, and laparoscopic case volume and duration, this was no longer significant (adjusted odds ratio, 2.02; 95% confidence interval, 0.59–6.93).

Conclusion

Women significantly more often report physical complaints and inappropriate fit of the LigaSure, HALO PKS, ENSEAL, and Harmonic scalpel. Female sex is associated with 5-fold greater odds of physical complaints with laparoscopic device use. Further investigation of the surgeon factors underlying device-related strain is a critical next step to understanding and reducing surgeon ergonomic injury.

Keywords: Equipment design; Minimally invasive surgery; Occupational diseases; Sex bias; Surgical instruments

Gholamabbas Fallah Ghalhari, Somayeh Farhang Dehghan, Fahimeh Shakeri, Mohammad Javad Ghanadzadeh, Mehdi Asghari,

Assessing the monthly changes of heat stress indices in outdoor environment during a 15-year period: Case of study in a dry and warm climate,

Urban Climate,

Volume 31,

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100538,

ISSN 2212-0955,

https://doi.org/10.1016/j.uclim.2019.100538.

(https://www.sciencedirect.com/science/article/pii/S2212095518303274)

Abstract: The present study was aimed to assess the monthly changes in heat stress indices in outdoor environment during a 15-year period in Bandar-e-Abbas, Iran, as a representative of a dry and warm climate, based on meteorological data. The hourly meteorological data of air temperature and relative humidity from 2000 to 2014 (15 years) were obtained from the Iran Meteorological Organization. Three indices were considered to evaluate the degree of heat stress in outdoor environments: Wet-Bulb Globe Temperature Index (WBGT), Heat Index (HI), and Effective Temperature Index (ET). The highest average of WBGT index was in July (37.22 ± 0.43 °C) during the studied years, and the lowest was in January (18.73 ± 0.37 °C). The highest mean of heat index (HI) was in July (45.97 ± 1.85 °C), and the lowest average of this index was in January (24.13 ± 1.46 °C). In July, the effective temperature index (ET) had the highest average (31.02 ± 0.22 °C) in July and the lowest (16.35 ± 0.59 °C) was in January. On average, the WBGT index was higher than 28 °C (Very high status) in 55% of the days of the

year, which indicates a high risk for outdoor workers in the case of heat stress. Moreover, 27% of the days experience very hot situation in terms of Heat Index. Regarding the results of the ET index, 41.2% of the days totally indicate very warm and sultry condition. There was a significant correlation between temperature and relative humidity with three studied indices ($P < .001$). According to the results, it should be noted that outdoor workers of Bandar-e-Abbas, have high and very high heat stress in the spring and summer (especially in July), which could lead to heat-related diseases. In this study, two important environmental parameters including air temperature and relative humidity were used for calculating the heat stress indices which were hourly measured at the weather stations.

Keywords: Heat stress; Wet-bulb globe temperature index; Heat index; Effective temperature index; Metrological data

Lucia Botti, Vincenzo Duraccio, Maria Grazia Gnoni, Cristina Mora,

An integrated holistic approach to health and safety in confined spaces,

Journal of Loss Prevention in the Process Industries,

Volume 55,

2018,

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https://doi.org/10.1016/j.jlp.2018.05.013.

(https://www.sciencedirect.com/science/article/pii/S0950423017302565)

Abstract: Confined space work is a high-risk activity, posing a significant hazard for both workers and rescuers involved in the emergency response. Risks due to working in confined spaces can be extremely dangerous. The leading cause of accidents and fatalities in confined

spaces is atmospheric condition. Further common causes are fire, explosion, ignition of flammable contaminants, spontaneous combustion and contact with temperature extremes. Although confined space work is a high-risk activity, few studies have been oriented aiming to define structured procedures or comprehensive tools to identify and manage the risks of work in confined space. An organized and reliable methodology to assess and control risks associated with working in confined spaces in the process industry is missing. The aim of this paper is to propose a structured procedure for analyzing and managing risks in confined spaces in the process industry. After a first literature review on the topic and an historical analysis on accidents in confined spaces, the authors conceptualize a framework to prevent and manage the risks from working in confined spaces. The tool collects the concepts and requirements from the fragmented regulations on safe work in confined spaces, aiming to support both the assessment and the risk management. Two test cases show the application of the proposed framework showing an ex-post analysis carried out on a real accident occurred during a task execution in a confined space and an ex-ante assessment for risk prevention.

Keywords: Confined space; Risk assessment; Risk management; Safety procedure; Industrial safety; Job hazard analysis

Bingyu Wang, Jinsong Zhao,

Automatic frequency estimation of contributory factors for confined space accidents,

Process Safety and Environmental Protection,

Volume 157,

2022,

Pages 193-207,

ISSN 0957-5820,

https://doi.org/10.1016/j.psep.2021.11.004.

(https://www.sciencedirect.com/science/article/pii/S0957582021006005)

Abstract: Although the dangers of working in confined spaces have been known for many years, fatal accidents related to working in confined spaces still frequently occur. Considerable research has been conducted to identify potential contributory factors of confined space incidents through analyzing accident reports. However, accident databases are usually read and interpreted manually by human experts. The process of analyzing confined space accident reports can be time-consuming and labor-intensive. As the number of accident records increases, it is difficult for the experts to manually review all the reports. Moreover, different individuals may reach various conclusions from the same accident report. Some analysts may fail to capture all the meaningful and relevant causal factors. Automatic information extraction using special rules and ontology-based approaches can be used to mine reports of confined space accidents. However, such approaches tend to suffer from the problem of weak generalization. To overcome this limitation and improve the performance of contributory factors analysis, an improved deep learning based framework is proposed in this paper to automatically extract and classify contributory factors from confined space accident reports using BERT-BiLSTM-CRF and CNN models. Research results suggested that the proposed framework can be used as a feasible method to qualitatively and quantitatively explore the contributory factors of confined space accidents. By analyzing a large quantity of confined space accident reports, the frequency of contributory factors can be estimated automatically. This outcome is helpful to significantly improve the risk assessment quality of confined space works.

Keywords: Confined space; Accident reports; Text-mining; BERT-BiLSTM-CRF; CNN

Ibrahim M. Abdel-Salam, Nihal El-Sayed Awadein, Mohamed Ashour,

Cytotoxicity of Luffa cylindrica (L.) M.Roem. extract against circulating cancer stem cells in hepatocellular carcinoma,

Journal of Ethnopharmacology,

Volume 229,

2019,

Pages 89-96,

ISSN 0378-8741,

https://doi.org/10.1016/j.jep.2018.09.034.

(https://www.sciencedirect.com/science/article/pii/S0378874118329489)

Abstract: Ethnopharmacological relevance

Luffa cylindrica (L.) M.Roem. has been recognized as traditional medicine for the treatment of various diseases like inflammatory diseases, diarrhea and viral infections. The usual parts used include fruit, seeds and leaves.

Aim of the study

To evaluate the anticancer activity of the hot water extract of the whole plant of Luffa cylindrica using circulating tumor cells and cancer stem cells isolated from the peripheral blood of hepatocellular carcinoma patients in vitro.

Materials and methods

Seventy five adult patients who reported as stage II and III Hepatocellular carcinoma were selected. Blood samples were withdrawn and the circulating tumor cells were isolated from the whole blood. Tumor cells and cancer stem cells were detected and isolated by flow cytometric techniques. The isolated cell types were cultured and propagated in the tissue culture facility, the extract was tested on the isolated cells.

Results

Luffa cylindrica hot water extract has shown cytotoxic activity against circulating tumor cells of hepatocellular carcinoma especially the cells sub-population CD133+/CD44+ with little effect among CD133+/CD44- sub-population.

Conclusion

Hot water extract of Luffa cylindrica whole plant could decrease the ratio of cancer stem cells in blood of HCC patients and may be used to minimize recurrence and metastasis in hepatocellular carcinoma patients.

Keywords: Luffa cylindrica; Cancer stem cells; Hepatocellular carcinoma; CD133/CD44

Long H Nguyen, David A Drew, Mark S Graham, Amit D Joshi, Chuan-Guo Guo, Wenjie Ma, Raaj S Mehta, Erica T Warner, Daniel R Sikavi, Chun-Han Lo, Sohee Kwon, Mingyang Song, Lorelei A Mucci, Meir J Stampfer, Walter C Willett, A Heather Eliassen, Jaime E Hart, Jorge E Chavarro, Janet W Rich-Edwards, Richard Davies, Joan Capdevila, Karla A Lee, Mary Ni Lochlainn, Thomas Varsavsky, Carole H Sudre, M Jorge Cardoso, Jonathan Wolf, Tim D Spector, Sebastien Ourselin, Claire J Steves, Andrew T Chan, Christine M. Albert, Gabriella Andreotti, Bijal Bala, Bijal A. Balasubramanian, Laura E. Beane-Freeman, John S. Brownstein, Fiona J. Bruinsma, Joe Coresh, Rui Costa, Annie N. Cowan, Anusila Deka, Sandra L. Deming-Halverson, Maria Elena Martinez, Michael E. Ernst, Jane C. Figueiredo, Pedro Fortuna, Paul W. Franks, Laura Beane Freeman, Christopher D. Gardner, Irene M. Ghobrial, Christopher A. Haiman, Janet E. Hall, Jae H. Kang, Brenda Kirpach, Karestan C. Koenen, Laura D. Kubzansky, James V. Lacey, Jr, Loic Le Marchand, Xihong Lin, Pam Lutsey, Catherine R. Marinac, Maria Elena Martinez, Roger L. Milne, Anne M. Murray, Denis Nash, Julie R. Palmer, Alpa V. Patel, Eric Pierce, McKaylee M. Robertson, Lynn Rosenberg, Dale P. Sandler, Shepherd H. Schurman,

Kara Sewalk, Shreela V. Sharma, Christopher J. Sidey-Gibbons, Liz Slevin, Jordan W.. Smoller, Claire J. Steves, Maarit I. Tiirikainen, Scott T. Weiss, Lynne R. Wilkens, Feng Zhang,
Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study,
The Lancet Public Health,
Volume 5, Issue 9,
2020,
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(https://www.sciencedirect.com/science/article/pii/S246826672030164X)

Abstract: Summary

Background

Data for front-line health-care workers and risk of COVID-19 are limited. We sought to assess risk of COVID-19 among front-line health-care workers compared with the general community and the effect of personal protective equipment (PPE) on risk.

Methods

We did a prospective, observational cohort study in the UK and the USA of the general community, including front-line health-care workers, using self-reported data from the COVID Symptom Study smartphone application (app) from March 24 (UK) and March 29 (USA) to April 23, 2020. Participants were voluntary users of the app and at first use provided information on demographic factors (including age, sex, race or ethnic background, height and weight, and occupation) and medical history, and subsequently reported any COVID-19 symptoms. We used Cox proportional hazards modelling to estimate multivariate-adjusted hazard ratios (HRs) of our

primary outcome, which was a positive COVID-19 test. The COVID Symptom Study app is registered with ClinicalTrials.gov, NCT04331509.

Findings

Among 2 035 395 community individuals and 99 795 front-line health-care workers, we recorded 5545 incident reports of a positive COVID-19 test over 34 435 272 person-days. Compared with the general community, front-line health-care workers were at increased risk for reporting a positive COVID-19 test (adjusted HR 11·61, 95% CI 10·93–12·33). To account for differences in testing frequency between front-line health-care workers and the general community and possible selection bias, an inverse probability-weighted model was used to adjust for the likelihood of receiving a COVID-19 test (adjusted HR 3·40, 95% CI 3·37–3·43). Secondary and post-hoc analyses suggested adequacy of PPE, clinical setting, and ethnic background were also important factors.

Interpretation

In the UK and the USA, risk of reporting a positive test for COVID-19 was increased among front-line health-care workers. Health-care systems should ensure adequate availability of PPE and develop additional strategies to protect health-care workers from COVID-19, particularly those from Black, Asian, and minority ethnic backgrounds. Additional follow-up of these observational findings is needed.

Funding

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Martin Jankovský, Ján Merganič, Michal Allman, Michal Ferenčík, Valéria Messingerová,
The cumulative effects of work-related factors increase the heart rate of cabin field machine operators,
International Journal of Industrial Ergonomics,
Volume 65,
2018,
Pages 173-178,
ISSN 0169-8141,
https://doi.org/10.1016/j.ergon.2017.08.003.
(https://www.sciencedirect.com/science/article/pii/S0169814116301779)

Abstract: Operating field machines causes little physical exertion. However, the combined effects of work-related factors strain the cardiovascular system, elevating the heart rate of the operator. Our goal was to determine what work-related factors increased the risk of cardiovascular disease of cut-to-length machine operators. We created two generalized linear models. A model consisting of 678 cases, explained 32% of the heart rate variability through the operators' height and weight, machine types, parts of the shifts, lighting, and whole-body vibrations. To identify which factors actually increased the risk of cardiovascular diseases, we assessed a subset (193 cases) of heart rates elevated above 90 beats per minute. We found that the operators' height, machine types, parts of the shifts, equivalent noise, lighting, and whole-body vibrations explained about 72% of the elevated heart rate variability. The elevated heart rate depended on variables, which can be optimized to decrease the risk of cardiovascular diseases.

Relevance to industry

Cabin field machines are widely used in various industries. Our findings show that factors of the work environment affect the circulatory systems of the operators less than shiftwork. In order to

further reduce the effects of work on operators, we should put more focus on improving the work organization.

Keywords: Work environment; Multi-factor assessment; Biofeedback; Shiftwork

Jingjing Xia, Yi Liu, Dongfeng Zhao, Yue Tian, Jianguo Li, Yufa Zhong, Nitin Roy,
Human factors analysis of China's confined space operation accidents from 2008 to 2018,
Journal of Loss Prevention in the Process Industries,
Volume 71,
2021,
104480,
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https://doi.org/10.1016/j.jlp.2021.104480.
(https://www.sciencedirect.com/science/article/pii/S0950423021000917)

Abstract: In recent years, several accidents in confined spaces have threatened the safety of staff and property in industries. A statistical analysis of 120 fatal accidents involving confined space operations in China from 2008 to 2018 was conducted in this study. The causes and characteristics of confined space operations accidents (CSOAs) were summarized. Focusing on the impact of human factors on CSOAs, the HFACS-MCS (HFACS-Modified Confined Space Accident) model, which consists of 5 levels and 21 factors, was established based on HFACS (Human Factors Analysis and Classification System). The chi-square ($\chi 2$) test and the OR analysis were implemented to analyze the statistically significant correlations between adjacent levels in the model. Finally, three human influence paths in CSOAs were derived. The results show that inadequate safety culture, organizational process vulnerability, inadequate supervision, supervisory violations, decision errors, and operational violations are the principal causes of the

accidents. Besides, hurried and ad hoc rescue often caused more casualties. The targeted pre-accident prevention and post-accident emergency rescue countermeasures are proposed to prevent the recurrence of CSOAs and secondary accidents.

Keywords: Hazards identification; Human factors; HFACS-MCS; Statistical analysis; Countermeasures

L.Di Donato, F. Longo, A. Ferraro, M. Pirozzi,

An advanced solutions for operators' training working in confined and /or pollution suspected space,

Procedia Manufacturing,

Volume 42,

2020,

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https://doi.org/10.1016/j.promfg.2020.02.080.

(https://www.sciencedirect.com/science/article/pii/S2351978920306454)

Abstract: Carrying out maintenance, regulation, installation of mechanical parts, cleaning and other activities in confined and / or suspected pollution spaces, often represents a challenge; indeed many are the cases of fatal incidents for operators. As in every country, there are ad-hoc regulations to increase the safety of operators at work: as far as Italy is concerned, the decree 177/2011 requires the qualification of companies operating in confined and / or suspected of pollution spaces with the aim of raising the level of safety, also defining strict criteria for all those business contracts related to confined spaces. However, while regulations clearly define what confined spaces are, the training issues are not appropriately addressed (e.g. the Italian

legislation only makes reminder to general laws such as the decree 81/2008) and there is no uniformity in terms of methods, procedures and required training times for operators working in confined spaces. The Italian National Institute for Insurance against Accidents at Work (INAIL) has conceptualized and developed a physical simulator for training those operators working in confined spaces. The research activities carried out by using the physical simulator points out that the integration of Industry 4.0 enabling technologies (such as Virtual and Augmented Reality developed in cooperation with University of Calabria) may further extend the training capabilities and operators' skills. The idea proposed in this article is to show how live exercises made with a physical simulator combined with Virtual Immersive and Interactive Reality can be profitably used to tackle the operators' training problem within confined spaces.

Keywords: Confined Spaces; Advanced Training; Virtual Reality; Industry 4.0

Blesson M. Varghese, Alana L. Hansen, Susan Williams, Peng Bi, Scott Hanson-Easey, Adrian G. Barnett, Jane S. Heyworth, Malcolm R. Sim, Shelley Rowett, Monika Nitschke, Ross Di Corleto, Dino L. Pisaniello,

Determinants of heat-related injuries in Australian workplaces: Perceptions of health and safety professionals,

Science of The Total Environment,

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137138,

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https://doi.org/10.1016/j.scitotenv.2020.137138.

(https://www.sciencedirect.com/science/article/pii/S0048969720306483)

Abstract: Introduction

Hot workplace environments can lead to adverse health effects and contribute to a range of injuries. However, there is limited contextual understanding of heat-related injury occurrence. Gaining the perspectives of occupational health and safety professionals (HSPs) may elucidate the issue and inform targeted interventions.

Methods

A cross-sectional national online survey was conducted in Australia to characterise HSP perceptions of heat-related injuries; current preventive measures; training, policies and guidelines; and perspectives on barriers for prevention. Results were analysed descriptively and a log-Poisson regression model was used to identify risk factors associated with HSP reported injury occurrence, assessed through prevalence ratio (PR).

Results

Of the 307 HSP survey participants, 74% acknowledged the potential for increased risk of occupational injuries in hot weather. A variety of injury types and mechanisms were reported, including manual handling injuries, hand injuries, wounds or lacerations, and loss of control of power tools. Correlates of reported heat-related injuries included working in the sun without shade [PR: 1.26; 95% CI: 1.07–1.48] and too few rest breaks [PR: 1.28; 95% CI: 1.04–1.44]. Other factors of significance were inadequate hydration; issues with personal protective equipment (PPE) and poor supervision of workers. Only 42% reported that adequate heat training was available and 54% reported the provision for outdoor work to cease in extreme temperatures. It was acknowledged that the frequency of injuries could be reduced with wider adoption of self-pacing, and work/rest regimes. Perceived barriers for prevention included: lack of awareness of physical injury risks, and management concerns about productivity loss and/or deadlines.

Conclusion

The findings indicate a range of potentially modifiable work and organisational risk factors such as more suitable PPE and better supervision. More attention to these factors, in conjunction with traditional interventions to reduce heat effects, could enhance injury prevention and labour productivity in people working in hot environments.

Keywords: Occupational health; Workplace heat exposure; Work-related injuries; Perceptions; Safety professionals

Nikki Rommers, Roland Rössler, Lennert Goossens, Roel Vaeyens, Matthieu Lenoir, Erik Witvrouw, Eva D'Hondt,

Risk of acute and overuse injuries in youth elite soccer players: Body size and growth matter,

Journal of Science and Medicine in Sport,

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(https://www.sciencedirect.com/science/article/pii/S144024401930355X)

Abstract: Objectives

This study investigated anthropometric measures and growth as risk factors for overuse and acute injuries in younger (U10–U12) and older (U13–U15) elite level soccer players.

Design

Prospective cohort study.

Methods

Height, weight, and sitting height were measured at the start and the end of the 2016–2017 competitive season and growth velocities were calculated. Throughout the season, injuries were registered continuously by the (para-)medical staff of the included clubs. We analyzed the injury risk using multilevel Poisson regression models, accounting for club and team clustering.

Results

Of the included 314 players (11.7±1.7 years of age), 160 players sustained 133 overuse and 163 acute injuries (i.e. 106 injuries in 69 players of the younger group, 190 in 91 players of the older group). In the younger group, risk of overuse injuries was associated with an increase in leg length over the season (incidence rate ratio (IRR) 1.620 [95% CI 1.230–2.117]) and risk of acute injuries with relatively younger age (IRR 1.003 [95% CI 1.000–1.006]). In the older group, a higher leg length was associated with an increased risk of overuse injuries (IRR 1.055 [95% CI 1.011–1.108]), and a higher weight and a lower growth rate with an increased risk of acute injuries (IRR 1.043 [95% CI 1.021–1.067] and 0.903 [95% CI 0.831–0.981], respectively).

Conclusions

Injury risk factors differ by age group and type of injury. The age-specific anthropometric and growth-related risk factors should be monitored and these risk profiles should be considered to manage injury risk effectively.

Keywords: Football; Injury risk; Injury prevention; Child; Adolescent; Youth sport

Motaz Alaqeel, Michael Tanzer,

Improving ergonomics in the operating room for orthopaedic surgeons in order to reduce work-related musculoskeletal injuries,

Annals of Medicine and Surgery,

Volume 56,

2020,

Pages 133-138,

ISSN 2049-0801,

https://doi.org/10.1016/j.amsu.2020.06.020.

(https://www.sciencedirect.com/science/article/pii/S2049080120301606)

Abstract: Introduction

Orthopaedic surgery is characterized by surgical tasks that are physical, repetitive and require some degree of stamina from the surgeon. Occupational injuries are alarmingly common in orthopaedic surgery with two-thirds of all surgeons reporting a work-related musculoskeletal (MSK) injury during their career. One of the leading causes of the high level of MSK injuries among orthopaedic surgeon is lack of ergonomics of the operating room. Implementing an ergonomic process has been shown to be effective in reducing the risk of developing MSK disorders in other high-risk industries. We reviewed well-established and effective ergonomic guidelines from the industrial workplace and determined the pertinent principles that could be transferred to the operating room to help reduce the number and severity of common orthopaedic work-related MSK injuries.

Methods

We reviewed the ergonomic guidelines, primarily from the Occupational Safety and Health Administration (OSHA), that specifically address minimizing the risk of these work-related injuries and that are transferable to the operating room. In addition, the ergonomic guidelines from the Canadian Center for Occupational Health and Safety (CCOHS), the National Institute for Occupational Safety and Health (NIOSH) and the Centers for Disease Control and Prevention (CDC) were reviewed.

Results

Many of the guidelines to avoid work-related injuries in industry are transferable to the operating room. The pertinent guidelines clearly indicated how to adjust the height of the operating table, the proper design of hand and power tools and the modifications to the operating room environment that can help prevent injury. These guidelines from industry include maintaining a neutral posture and joint alignment, working with the appropriate hand tools and minimizing the lower extremity fatigue by using the proper footwear and floor mats.

Discussion

Optimizing the occupational environment and utilizing well-established ergonomic principle from industry is both feasible and practical in the operating room to decrease the incidence of musculoskeletal injuries among this high-risk profession. These guidelines are simple, effective and are easy to implement by orthopaedic surgeons in order to minimize their risk of sustaining a work-related injury.

Keywords: Ergonomics; Injury; Orthopaedic; Operating room; Work; Musculoskeletal

Keith K. Bolsen,

Silage review: Safety considerations during silage making and feeding,

Journal of Dairy Science,

Volume 101, Issue 5,

2018,

Pages 4122-4131,

ISSN 0022-0302,

https://doi.org/10.3168/jds.2017-13738.

(https://www.sciencedirect.com/science/article/pii/S0022030218303308)

Abstract: ABSTRACT

Silage-related injury knows no age boundary as workers and bystanders of all ages have been killed in silage accidents. Even the best employee can become frustrated with malfunctioning equipment and poor weather conditions and take a hazardous shortcut, or misjudge a situation and take a risky action. At least 6 hazards are encountered in managing silage in bunker silos and drive-over piles that endanger lives: tractor or truck rollover, run-over by or entanglement in machinery, fall from height, crushing by an avalanche or collapsing silage, silage gases, and complacency or fatigue. These hazards are presented in detail along with accounts of 14 individual case studies involving several of them. Guidelines that can dramatically reduce the risk of serious injuries or fatalities from each of the hazards are presented. Every farm, feedlot, dairy, and silage contractor should have written safety policies and procedures for their silage program, and they should schedule regular meetings with all their employees to discuss and demonstrate safety. The most important goal in every silage program is to send all employees home safely to their families at the end of the day.

Keywords: silage; safety; avalanche; fatality

Salaheddine Bendak, Rene Jouaret, Hamad Rashid,

Effects of high ambient temperature on construction workers performance: A longitudinal empirical study,

Journal of Safety Research,

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(https://www.sciencedirect.com/science/article/pii/S0022437522000299)

Abstract: Introduction: The construction industry is known to be of high-risk when compared to other industries. Ambient temperature can also exacerbate this risk, where hot weather conditions can lead to increased physical and mental fatigue, reduced performance, slower reactions and more human errors. Yet this issue is rarely researched objectively. This paper describes a longitudinal empirical study that aimed to assess how high ambient temperatures affect construction workers performance. Method: A sample of 120 randomly selected workers (age range 22–35 years) from a large construction company in Dubai participated in this study. Since construction workers performance cannot be directly measured due to the nature of work involved, performance of 60 participants was measured on a task battery involving single reaction time and choice reaction time in summer months before starting work and 5.5 h after starting work. Then the same procedure was repeated on 60 workers in winter months. Accident reports for one full year within the same company were also collected and analyzed. Results: Results show that performance on both tasks before starting work was significantly lower in summer than in winter months possibly due to accumulated fatigue resulting from the high ambient temperature in summer. Results also show that performance on both tasks significantly deteriorated during the first 5.5 h of work to a greater extent in summer months than in winter months. Results also indicate that accidents showed an increasing trend in summer months. Conclusions: Accumulated fatigue due to high ambient temperature in Summer is thought to cause this drop in performance and increase in accidents. Practical implications: Based on the findings, recommendations to enhance construction workers performance and reduce accidents are given.

Keywords: Construction workers; Work performance; High ambient temperature; Human fatigue; Human errors

Paa K. Bordoh, Asgar Ali, Matthew Dickinson, Yasmeen Siddiqui, Gianfranco Romanazzi,
A review on the management of postharvest anthracnose in dragon fruits caused by Colletotrichum spp.,
Crop Protection,
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2020,
105067,
ISSN 0261-2194,
https://doi.org/10.1016/j.cropro.2019.105067.
(https://www.sciencedirect.com/science/article/pii/S0261219419304132)

Abstract: Colletotrichum spp is one of the major cosmopolitan phytopathogens that cause postharvest anthracnose in dragon fruits. The pathogen attacks fruits on the field, during long-distance transport, and cold storage, leading to shorter shelf life. Traditionally, the plants are sprayed with synthetic fungicides, which is a strategic approach to control diseases in general and anthracnose in particular for dragon fruit production. Due to the demand for safe storage methods for consumers and the concerns about the use of synthetic fungicides, their use is restricted to control dragon fruits anthracnose after harvest. Despite “Umikai” (natural Calcium) is the commonly used preservative by some exporters of dragon fruits in Vietnam, recent reports indicated that Sodium nitroprusside (a Nitric oxide donor) markedly controlled anthracnose in dragon fruit at recommended levels. However, due to detrimental effect of these nitric oxide donors and other synthetic chemicals on human health, concerns are raised by the governments and other stakeholders to abolish, if not regulate the use of these synthetic chemicals in pre- and postharvest management of anthracnose. Consequently, several alternative methods have been

developed to control postharvest decay, but with little success. This review summarizes the findings published within the last decade on current management practices on postharvest anthracnose in dragon fruit. We conclude that hot air/vapor heat treatment, water treatment, modified and controlled atmosphere packaging are commercially practiced and effective in reducing postharvest decay in dragon fruits while, X-ray irradiation is still under experimentation, Additionally, natural products (propolis and chitosan) shows promising effect without leaving residual harmful effect and could be adopted on a commercial scale to reduce postharvest losses after further commercial trials.

Keywords: Management; Postharvest decay; Alternative treatments; Anthracnose; Colletotrichum spp.; Dragon fruits; Shelf life

Chalearmpong Pinupong, Wattana Jalayondeja, Keerin Mekhora, Petcharatana Bhuanantanondh, Chutima Jalayondeja,

The Effects of Ramp Gradients and Pushing–Pulling Techniques on Lumbar Spinal Load in Healthy Workers,

Safety and Health at Work,

Volume 11, Issue 3,

2020,

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ISSN 2093-7911,

https://doi.org/10.1016/j.shaw.2020.05.001.

(https://www.sciencedirect.com/science/article/pii/S2093791120302754)

Abstract: Background

Many tasks in industrial and health care setting are involved with pushing and pulling tasks up or down on a ramp. An efficient method of moving cart which reduces the risk of low back pain should be concerned. This study aimed to investigate the effects of handling types (HTs) and slope on lumbar spinal load during moving a cart on a ramp. We conducted a 2 × 2 × 4 factorial design with three main factors: 2 HTs, 2 handling directions of moving a cart and 4 degrees of ramp slope.

Methods

Thirty healthy male workers performed 14 tasks consist of moving a cart up and down on the ramp of 0°, 10°, 15°, and 20° degrees with pushing and pulling methods. Joint angles from a 3D motion capture system combined with subject height, body weight, and hand forces were used to calculate the spinal load by the 3DSSPP program.

Results

Our results showed significant effect of HT, handling directions and slope on compression and shear force of the lumbar spine ($p < 0.001$). When the ramp gradient increased, the L4/5 compression forces increased in both pushing and pulling ($p < 0.001$) Shear forces increased in pulling and decreased in pushing in all tasks. At high slopes, pulling generated more compression and shear forces than that of pushing ($p < 0.01$).

Conclusion

Using the appropriate technique of moving a cart on the ramp can reduce the risk of high spinal load, and the pushing is therefore recommended for moving a cart up/down on ramp gradients.

Keywords: Manual handling; Pulling; Pushing; Slope of ramp floor; Spinal load

Farzaneh Khorsandi, Paul D. Ayers, Eric J. Fong,

Evaluation of Crush Protection Devices for agricultural All-Terrain Vehicles,

Biosystems Engineering,

Volume 185,

2019,

Pages 161-173,

ISSN 1537-5110,

https://doi.org/10.1016/j.biosystemseng.2019.04.025.

(https://www.sciencedirect.com/science/article/pii/S1537511018308286)

Abstract: Statistics show that there are a large number of All-Terrain Vehicle (ATV) rollover-related injuries and fatalities in the agriculture sector. Properly designed and installed Crush Protection Devices (CPDs) can potentially decrease the operator injuries in an ATV rollover accident. The CPD of a vehicle protects the operator by increasing the crush protection zone (CPZ) under the overturned vehicle. Several operational and safety evaluation criteria for ATVs equipped with CPDs were developed in this study. Some of criteria were evaluated in previous studies but required further assessment. Previous studies regarding the CPD performance in ATV rollover accidents were reviewed. Also, several factors related to operational and safety criteria for three designs of CPD (Quadbar, Lifeguard, and Air-Quad) mounted on 13 ATV models were measured. Factors include the shape and volume of the rear and side CPZ and the increase in the height of the centre of gravity height when the ATV is equipped with a CPD. The results of this study showed that the installation of a CPD increases the CPZ volume compared to the baseline ATV, in the event of a rollover accident. The AIR-Quad, Quadbar, and Lifeguard systems increased the rear CPZ volume with an average of 0.48 m3 (111% increase), 0.39 m3 (92% increase), and 0.15 m3 (35% increase), respectively, compared to the average CPZ of a baseline ATV which is 0.44 m3. Also, a CPD increases the distance between the seat reference point and the ground surface during a rollover accident.

Keywords: All-Terrain Vehicles; Crush Protection Device; Crush Protection Zone; Operator Protection Device; Rollover Protective Structure; Safety

Yi-Chun Lin, Chen-Peng Chen,
Thermoregulation and thermal sensation in response to wearing tight-fitting respirators and exercising in hot-and-humid indoor environment,
Building and Environment,
Volume 160,
2019,
106158,
ISSN 0360-1323,
https://doi.org/10.1016/j.buildenv.2019.05.036.
(https://www.sciencedirect.com/science/article/pii/S0360132319303622)

Abstract: Half-mask respirators have been increasingly used in public facilities to protect against indoor air contaminants. However, when they are used, the respiratory heat flow is restrained and its release into the environment is limited. This study evaluated the thermal burden on respirator users in an indoor environment where a significant heat load from hot-and-humid air is introduced. Twenty-five participants walked on the stairs at a speed of 4.6 km/h wearing a filtering facepiece respirator (N95 mask) or elastomeric facepiece respirator under varying air temperatures and relative humidity (RH). The thermo-physiological properties on the nasal, facial, and forearm skin and the temperature/RH of the breath were evaluated. Thermal sensation was also surveyed. The results showed that a thermal microclimate was developed inside the mask, with the heat index in the microclimate of N95 masks being elevated to 61.2–67.9 °C and a risk level of “Extreme Danger”. The metabolic heat from respirator use shifted the paradigm of

thermoregulation to a scheme involving localized enhancement in thermoregulation. When using N95 masks the skin moisture level was increased by 77%–588% and the transepidermal water loss by 18%–72%. Thermoregulation underlying heat strain was near-saturated at 33 °C, and an abrupt increase of 1.6- to 3.6-fold in thermal sensation was concurrently observed. The threshold-controlled increase in sensation was likely a result of the thermal strain capacity being overwhelmed. These findings demonstrated that even under room temperature, caution should be exercised when using N95 masks for performing tasks of moderate metabolic load.

Keywords: Thermo-physiology; Thermal sensation vote; Acclimatization; Respirators; Thermal microclimate; Metabolic heat

Faranak Golkhorshidi, Armin Sorooshian, Ahmad Jonidi Jafari, Abbas Norouzian Baghani, Majid Kermani, Roshanak Rezaei Kalantary, Qadir Ashournejad, Mahdieh Delikhoon,
On the nature and health impacts of BTEX in a populated middle eastern city: Tehran, Iran,
Atmospheric Pollution Research,
Volume 10, Issue 3,
2019,
Pages 921-930,
ISSN 1309-1042,
https://doi.org/10.1016/j.apr.2018.12.020.
(https://www.sciencedirect.com/science/article/pii/S1309104218306524)

Abstract: This study describes a spatio-temporal characterization of concentrations of BTEX in ambient air of four hot spots (bus terminals) in the megacity of Tehran. Monte Carlo simulations were performed to evaluate cancer risk and non-cancer risk owing to BTEX exposure in three age groups (<6, 6 to <21 and 21 to <81 years). The average toluene to benzene ratios for the four

intercity bus terminals were 2.63 (summer) and 2.88 (winter). Furthermore, the mean xylenes to benzene and ethylbenzene to benzene ratios in the two seasons for all stations ranged from 3.33 to 4.40 (summer) and 2.13–2.80 (winter), respectively. There was insignificant difference in BTEX levels between working and non-working days owing to the lack of change in vehicular traffic during the full week. Factors promoting BTEX formation in the study region were fuel evaporation, gas stations, diesel bus emissions, and a lack of hydroxyl radicals (OH) for reacting with the target compounds. Calculations suggested that cancer risk for benzene and ethylbenzene in three age groups at the four bus terminals exceeded values recommended by U. S. EPA. In addition, the hazard quotient for BTEX in both seasons for different age groups ranged between $1.23 \times 10{-}5$ and $3.58 \times 10{-}1$, values of which were lower than reference levels. Carcinogenic emissions such as with benzene and ethylbenzene discharged by bus terminals impact the growing population in the study region, which requires additional action to reduce health effects.

Keywords: Carcinogenic; BTEX; Bus terminal; Working and non-working days; Cancer risk; Hazard quotient

Maureen Heraty Wood, Mark Hailwood, Konstantinos Koutelos,
Reducing the risk of oxygen-related fires and explosions in hospitals treating Covid-19 patients,
Process Safety and Environmental Protection,
Volume 153,
2021,
Pages 278-288,
ISSN 0957-5820,
https://doi.org/10.1016/j.psep.2021.06.023.
(https://www.sciencedirect.com/science/article/pii/S0957582021003141)

Abstract: On 24 April 2021, a disastrous fire in an Iraqi hospital took the lives of 82 people. Since the outbreak of the pandemic in March 2020, incidents of oxygen-related hospital fires in various countries around the world have caused over 200 deaths, the majority of whom were patients extremely ill with the novel Coronavirus. Fires involving medical oxygen are not a new phenomenon but are more common in the operating theatre where oxygen is routinely administered. In these settings, strict safety protocols are normally enforced and surgical staff are well trained in dealing with oxygen hazards. It appears that some hospitals may not have been fully prepared for the elevated risk of oxygen-related fire in intensive care units due to the high demand for oxygen therapy in severely ill Covid-19 patients. Indeed, gas producers and public health authorities were also slow to recognize and alert hospitals to the potential dangers. Oxygen is essential to life and generally makes up about 21 % of the gases in the air we breathe. Pure oxygen reacts with common materials such as oil and grease to cause fires, and even explosions, when released at high pressures. A leaking valve or hose, and openings at interfaces of masks and tubes, when in a confined space or where air circulation is low, can quickly increase the oxygen concentration to a dangerous level. Even a small increase in the oxygen level in the air to 24 % can create a fire hazard. In an oxygen-enriched environment, materials become easier to ignite and fires will burn hotter and more fiercely than in normal air. There is also a potentially heightened risk of using ethanol-based and organic solvents as cleaning agents in an oxygen rich atmospheres. This paper will provide an overview of oxygen accident scenarios that may be relevant for hospital intensive care units, with particular reference to recent events and similar accidents that have occurred in the past. The paper will recommend that hospitals recognize their chemical risks as part of their risk governance responsibility and assign chemical risk management a prominent role in their overall management. Investigation of dangerous events to extract causes and lessons learned should be utilized to highlight opportunities for prevention as

well as emergency response. The industrial gas industry also needs to actively support hospitals in adoption of more rigorous risk management approaches, building on lessons learned in chemical process safety for managing flammable and explosive atmospheres.

Keywords: Covid-19; Oxygen enriched atmosphere; Hospital fire; Intensive care; Fire safety + prevention; Oxygen hazard

Shuai Zhang, Neng Zhu,

Exercise heat acclimation causes human responses and safety performance improvements,

Journal of Thermal Biology,

Volume 100,

2021,

103042,

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https://doi.org/10.1016/j.jtherbio.2021.103042.

(https://www.sciencedirect.com/science/article/pii/S0306456521002102)

Abstract: Abstract:

Heat acclimation (HA) is a widely recognized physiological phenomenon of human body in hot environments. HA has many benefits, such aspreventing hyperthermia responses, and is an efficient way to improve human responses to hyperthermal environments. However, it is not known whether HA is dependent on the environmental conditions. Moreover, its mechanism and effect on the safety performance remain unexplored. In this study, we created a climate chamber to simulate a hyperthermal environment. Thirty healthy males were recruited for this study, who were then trained under the same ambient conditions (temperature of 38 °C and relative humidity (RH) of 40%). The training involved running on treadmills (at 5 km/h) to simulate heavy manual

labor, and performing heat stress tests (HST) under six different conditions (32 °C/40% RH, 35 °C/40%, 38 °C/40%, 32 °C/70%, 35 °C/70%, and 38 °C/70%). Their physiological indices (rectal temperature, heart rate, sweat loss and skin temperature) and one psychological index (thermal sensation) were measured. Furthermore, a hazard avoidance test device (HATD) was designed to evaluate the individual safety performance by detecting human errors. The results show that training and environmental conditions have different effects on HA. After HA, the physiological and psychological strain were significantly improved. More importantly, HA also helped improve the participants' awareness of the dangers and required emergency responses to face potential hazards. Overall, a reasonable HA training under proper conditions is helpful to ensure the safety of human beings. More research is needed to study the role of HA on safety performance.

Keywords: Hyperthermal environments; Heat acclimation; Physical response; Safety performance; Safety protection

Esmaeil Zarei, Mohammad Yazdi, Rouzbeh Abbassi, Faisal Khan,
A hybrid model for human factor analysis in process accidents: FBN-HFACS,
Journal of Loss Prevention in the Process Industries,
Volume 57,
2019,
Pages 142-155,
ISSN 0950-4230,
https://doi.org/10.1016/j.jlp.2018.11.015.
(https://www.sciencedirect.com/science/article/pii/S0950423018306752)

Abstract: Human factors are the largest contributing factors to unsafe operation of the chemical process systems. Conventional methods of human factor assessment are often static, unable to deal with data and model uncertainty, and to consider independencies among failure modes. To overcome the above limitations, this paper presents a hybrid dynamic human factor model considering Human Factor Analysis and Classification System (HFACS), intuitionistic fuzzy set theory, and Bayesian network. The model is tested on accident scenarios which have occurred in a hot tapping operation of a natural gas pipeline. The results demonstrate that poor occupational safety training, failure to implement risk management principles, and ignoring reporting unsafe conditions were the factors that contributed most failures causing accident. The potential risk-based safety measures for preventing similar accidents are discussed. The application of the model confirms its robustness in estimating impact rate (degree) of human factor induced failures, consideration of the conditional dependency, and a dynamic and flexible modelling structure.

Keywords: Process industries; HFACS; Human reliability assessment; Fuzzy AHP; Bayesian network

Erkan Dogan, Mehmet Ali Yurdusev, Sadik Alper Yildizel, Gokhan Calis,
Investigation of scaffolding accident in a construction site: A case study analysis,
Engineering Failure Analysis,
Volume 120,
2021,
105108,
ISSN 1350-6307,
https://doi.org/10.1016/j.engfailanal.2020.105108.

(https://www.sciencedirect.com/science/article/pii/S1350630720316320)

Abstract: The construction sector is one of the few high-risk businesses due to occupational accidents, their rate of frequencies, and related serious consequences, sometimes even resulting in the death of individuals. Therefore, it is a vital necessity and priority for employers and employees during the course of a project to comply with occupational safety rules under any circumstances. Nothing should deter or compromise the safety of any individual working in a potential risk environment. Within the scope of this study, the analysis addresses a scaffolding accident that occurred on a construction site. Once the information about how the accident possibly happened was received, the scaffolding in question identified at the construction was kept for an investigation to carry out the corrective and renovation works. In this paper the suspended scaffoldings are firstly categorized. Then how the accident happened was examined and theorized. The examination and analysis were supported by the results. This study is intended to prevent similar accidents and establish necessary precautions as a matter of procedure.

Keywords: Health and safety; Occupational accident; Falling from a height; Scaffolding

Debbie S. Silvester,

New innovations in ionic liquid–based miniaturised amperometric gas sensors,

Current Opinion in Electrochemistry,

Volume 15,

2019,

Pages 7-17,

ISSN 2451-9103,

https://doi.org/10.1016/j.coelec.2019.03.001.

(https://www.sciencedirect.com/science/article/pii/S2451910318302448)

Abstract: Gas detection is an essential part of everyday life; for some applications, using sensors for toxic and hazardous gases can literally mean the difference between life and death. In this minireview, recent progress in amperometric gas sensing using miniaturised electrodes and devices is described. The focus is on the use of nonvolatile room-temperature ionic liquids (RTILs) as electrolytes, which possess inherent advantages such as wide electrochemical windows, high thermal and chemical stability, intrinsic conductivity and good solvating properties. Various different gases, electrodes and RTILs have been investigated in the strive towards new materials for improved gas sensors. The most recent developments using porous membrane electrodes, planar devices (e.g. screen-printed, thin-film, microarray and interdigitated electrodes) and the modification of these surfaces for improved sensitivity are described. RTILs have great potential to be used as electrolytes in amperometric gas sensors, with improved lifespan of the sensor in hot/dry environments and allowing miniaturisation of devices. However, it is clear that more understanding of their long-term operation and utility in real environments (e.g. background air, varying temperatures and humidity levels) is needed before their realisation in successful commercial devices.

Keywords: Gas sensing; Amperometric; Ionic liquids; Miniaturised devices; Voltammetry; Chronoamperometry; Clark cell

Lucia Botti, Cristina Mora, Emilio Ferrari,
Design of a digital tool for the identification of confined spaces,
Journal of Loss Prevention in the Process Industries,
Volume 76,
2022,
104731,

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https://doi.org/10.1016/j.jlp.2022.104731.

(https://www.sciencedirect.com/science/article/pii/S0950423022000080)

Abstract: Statistics on accidents in confined spaces reveal that many workers are injured and killed each year while working in confined spaces. The main cause of accidents and fatalities due to work in confined spaces is related to the lack of awareness about the presence and the risks of such unconventional workplaces. A confined space hazard assessment and risk control program should be implemented prior to access a confined space, aiming to control the risks associated with working in a confined space. This paper introduces a structured procedure and a digital tool for mobile devices, which aim to increase workers' awareness about the risks of working in confined spaces. The proposed tool investigates four different categories of confinement that characterize confined spaces: geometry, access, internal configuration, and atmosphere. After completing the procedure on the mobile application, the user, e.g. the employer or the company's safety professional, receives a list of potential issues that should be addressed before entering the space. Three case studies show the application of the proposed methodology to three suspected confined spaces.

Keywords: Confined space; Identification; Digital tool; Risk assessment support; Occupational health and safety

Emad Abukhashabah, Ahmed Summan, Mansour Balkhyour,

Occupational accidents and injuries in construction industry in Jeddah city,

Saudi Journal of Biological Sciences,

Volume 27, Issue 8,

2020,

Pages 1993-1998,

ISSN 1319-562X,

https://doi.org/10.1016/j.sjbs.2020.06.033.

(https://www.sciencedirect.com/science/article/pii/S1319562X20302734)

Abstract: In Saudi Arabia, the construction industry has been growing remarkably during the past several years. However, the most hazardous worksites in the country may be found in this industry. This study identified the causes of accidents and injuries in the construction industry among 300 workers in Jeddah City, situated on the coast of the Red Sea. Results from the questionnaire showed that the major cause of accidents and injuries is the lack of awareness about occupational safety and lack of experience among the workers (>82%); and the most common type of accidents and injuries that occur in the construction industry, are workers falling from a height (>80%), and electrical shock (>60%). Recommendations to prevent accidents and injuries in this industry are provided in this paper.

Keywords: Construction industry; Accidents and injuries in construction industry; Causes of occupational accidents and injuries; Occupational injuries; Falling from a height - electric shock incidents

Andres Gonzalez-Cortes, Damien Burlet-Vienney, Yuvin Chinniah,

Inherently safer design: An accident prevention perspective on reported confined space fatalities in Quebec,

Process Safety and Environmental Protection,

Volume 149,

2021,

Pages 794-816,

ISSN 0957-5820,

https://doi.org/10.1016/j.psep.2021.03.026.

(https://www.sciencedirect.com/science/article/pii/S0957582021001403)

Abstract: The design of most industrial facilities incorporates confined spaces. Although they are not designed for human occupation, many workers penetrate them to perform tasks such as repairs, cleaning, and inspections while facing the risks of asphyxiation, drowning, and toxicity from chemical exposure. Legislative and normative frameworks recommend adopting Inherently Safer Design (ISD) principles as the primary accident prevention strategy However, confined space fatalities occur mainly during improvised interventions, emphasizing the need for designers to consider these accidents' underlying factors in their future or present projects. This paper provides an applied perspective, suggesting how practitioners can employ ISD principles to effectively overcome the inherent design deficiencies and hazards associated with confined space fatalities. For this purpose, ten confined space fatalities in six different sectors of activity were analyzed using the Causal Tree Method (CTM). Industrial process cases are included. Our results show that alternative safer designs of confined spaces or permanent adapted equipment could eliminate the need for a confined space entry or confined space work. A first model of a design-oriented solutions knowledge base, called Confined Space Permanent Collective Principles (CSPCP), is proposed. This model provides stakeholders from across various industries with an overview of safety measures that can be integrated at different life cycle phases to address confined space hazards.

Keywords: Confined space; Risk reduction; Inherently safer design; Causal tree method; Accident prevention; Occupational health and safety

Yunfeng Yang, Guohua Chen, Genserik Reniers, Floris Goerlandt,

A bibliometric analysis of process safety research in China: Understanding safety research progress as a basis for making China's chemical industry more sustainable,

Journal of Cleaner Production,

Volume 263,

2020,

121433,

ISSN 0959-6526,

https://doi.org/10.1016/j.jclepro.2020.121433.

(https://www.sciencedirect.com/science/article/pii/S0959652620314803)

Abstract: Along with the expansion of China's chemical industry, a series of catastrophic chemical accidents have occurred, often with severe human casualties, resulting in adverse effects on the sustainable development. In line with these developments, process safety research is also developing rapidly in China. This paper aims to present insights in the progress of process safety research in China using bibliometric analysis. The results indicate that in China the most productive authors, institutions, and provinces are located in economically developed coastal areas and in areas with more universities specializing in safety science and engineering. As for the international cooperation, the most significant collaborating countries are economically developed countries or China's neighbors, and these countries have published a large number of papers important in this field. The citation analysis shows that Chinese process safety research currently still has a relatively limited international impact. The analysis of hot topics shows that there currently are very few new methods or research topics introduced in recent years, and there is still significant room for the Chinese research community to improve in some subdomains of the research field. Based on these trends and apparent shortcomings in the literature, future research directions are proposed. The results contribute to understanding the overall situation of

process safety research in China, and can serve as a high-level synthesis of the research field. This information is useful for developing research and development policies and industrial strategies, and benefits the safety and sustainability of China's chemical industries.

Keywords: Process safety; Bibliometric analysis; China; International cooperation; Research trend; Sustainability

Miranda Dally, Jaime Butler-Dawson, Richard J. Johnson, Lyndsay Krisher, Diana Jaramillo, Kira L. Newman, Lee S. Newman,

Creatinine Fluctuations Forecast Cross-Harvest Kidney Function Decline Among Sugarcane Workers in Guatemala,

Kidney International Reports,

Volume 5, Issue 9,

2020,

Pages 1558-1566,

ISSN 2468-0249,

https://doi.org/10.1016/j.ekir.2020.06.032.

(https://www.sciencedirect.com/science/article/pii/S2468024920313553)

Abstract: Background

Chronic kidney disease of unknown origin (CKDu) is an epidemic that disproportionately affects young agriculture workers in hot regions. It has been hypothesized that repeated acute kidney injury (AKI) may play a role in the development of disease.

Methods

Latent class mixed models were used to identify groups of Guatemalan sugarcane harvesters based on their daily changes in creatinine over 6 consecutive days in 2018. Exponential

smoothing state space models were used to forecast end-of-season creatinine between the identified groups. Percent change in estimated glomerular filtration rate (eGFR) across the harvest was compared between groups.

Results

Twenty-nine percent (n = 30) of the 103 workers experienced repeated severe fluctuations in creatinine across shift. The model with multiplicative error, multiplicative trend, and multiplicative seasonality was able to accurately forecast end-of-season creatinine in the severe group (mean percentage error [MPE]: −4.7%). eGFR of workers in the severe group on average decreased 20% across season compared to 11% decline for those in the moderate group (95% confidence interval for difference: −17% to 0%).

Conclusions

Daily fluctuations in creatinine can be used to forecast end-of-season creatinine in sugarcane harvesters. Workers who experience repeat severe daily fluctuations in creatinine, on average, experience a greater reduction in kidney function across the season.

Keywords: agricultural workers; AKI; chronic kidney disease of unknown origin; forecasting; kidney function decline; occupational health

Anna Carfora, Carlo Pietro Campobasso, Paola Cassandro, Francesco La Sala, Alfonso Maiellaro, Antonio Perna, Raffaella Petrella, Renata Borriello,

Fatal inhalation of volcanic gases in three tourists of a geothermal area,

Forensic Science International,

Volume 297,

2019,

Pages e1-e7,

ISSN 0379-0738,

https://doi.org/10.1016/j.forsciint.2019.01.044.

(https://www.sciencedirect.com/science/article/pii/S0379073819300374)

Abstract: The study reports the environmental, toxicological and histopathological forensic investigations applied on three victims of accidental death (father, mother and son), due to the fall in a volcanic pothole, during the touristic visit of the “Solfatara park”, near Naples (Italy). At autopsy greenish skin discolouration was observed and all bodies showed the classical signs of asphyxial deaths, such as cyanosis and hemorrhagic pulmonary edema. Focal micro-hemorrhages were found in the brain at intracranial and subpial levels. The hemogasanalysis and spectrophotometric test on blood for Methemoglobin (MetHb), Carboxyhemoglobin (HbCO) and Sulfhemoglobin (SHb) showed pCO2, SHb and MetHb above the physiological levels. On biological specimens, toxicological analyses performed by GC/MS revealed high concentrations of hydrogen sulfide (H2S) and of thiosulfate (TS), its main metabolite. The monitoring of toxic gases on the death scene showed an unsafe environment, into the pothole, able to cause the sudden loss of consciousness of the victims with subsequent asphyxiation (knockdown effect). In particular, at the bottom of the hole, the maximum levels of H2S and carbon dioxide (CO2) were 2200 ppm and 98% respectively. For the family members, the cause of the death was assessed as acute poisoning by H2S and CO2. The fatalities, happened in quick succession as for a domino effect, were pretty similar to the asphyxial deaths by confined spaces, frequently observed in occupational setting. Fatalities secondary to accidental volcanic gases inhalation, such as H2S and CO2 in geothermal areas, have been already described but often without a forensic approach. To the best of our knowledge this is the first case that reports the accidental poisoning by volcanic gases involving three people, with different caracteristic of age and sex, allowing the

correlation between toxicological and pathological results with the true levels of asphyxiating gas, measured on the death scene.

Keywords: H2S poisoning; CO2 poisoning; Asphyxial deaths; Death in geothermal area

Mohammed I. Dairywala, Saurabh Gupta, Michael Salna, Tom C. Nguyen,
Surgeon Strength: Ergonomics and Strength Training in Cardiothoracic Surgery,
Seminars in Thoracic and Cardiovascular Surgery,
2021,
,
ISSN 1043-0679,
https://doi.org/10.1053/j.semtcvs.2021.09.015.
(https://www.sciencedirect.com/science/article/pii/S1043067921004305)

Abstract: With the high prevalence of musculoskeletal pain in surgeons and interventionalists, it is critical to analyze the impact of ergonomics on cardiothoracic surgeon health. Here, we review the existing literature and propose recommendations to improve physical preparedness for surgery both in and outside the operating room. For decades, cardiothoracic surgeons have suffered from musculoskeletal pain, most commonly in the neck, and back due to a lack of proper ergonomics during surgery. A lack of dedicated ergonomics curriculum during training may leave surgeons at a high predisposition for work-related musculoskeletal disorders. We searched PubMed, Google Scholar, and other sources for studies relevant to surgical ergonomics and prevalence of musculoskeletal disease among surgeons and interventionalists. Whenever possible, data from quantitative studies, and meta-analyses are presented. We also contacted experts and propose an exercise routine to improve physical preparedness for demands of surgery. To date, many studies have reported astonishingly high rates of work-related pain in

surgeons with rates as high as 87% in minimally-invasive surgeons. Several optimizations regarding correct table height, monitor positioning, and loupe angles have been discussed. Lastly, implementation of ergonomics training at some programs have been effective at reducing the rates of musculoskeletal pain among surgeons. Surgical work-related stress injuries are more common than we think. Many factors including smaller incisions and technological advancements have led to this plight. Ultimately, work-related injuries are underreported and understudied and the field of surgical ergonomics remains open for investigative study.

Keywords: Surgical ergonomics; Work-related musculoskeletal injuries; Physical training; Stretching; Exercise; Surgical performance

Zahra Naghavi K., Seyed B. Mortazavi, Hassan Asilian M., Ebrahim Hajizadeh,
Exploring the Contributory Factors of Confined Space Accidents Using Accident Investigation Reports and Semistructured Interviews,
Safety and Health at Work,
Volume 10, Issue 3,
2019,
Pages 305-313,
ISSN 2093-7911,
https://doi.org/10.1016/j.shaw.2019.06.007.
(https://www.sciencedirect.com/science/article/pii/S2093791118304840)

Abstract: Background
The oil and gas industry is one of the riskiest industries for confined space injuries. This study aimed to understand an overall picture of the causal factors of confined space accidents through analyzing accident reports and the use of a qualitative approach.

Methods

Twenty-one fatal occupational accidents were analyzed according to the Human Factors Analysis and Classification System approach. Furthermore, thirty-three semistructured interviews were conducted with employees in different roles to capture their experiences regarding the contributory factors. The content analyses of the interview transcripts were conducted using MAXQDA software.

Results

Based on accident reports, the largest proportions of causal factors (77%) were attributed to the organizational and supervisory levels, with the predominant influence of the organizational process. We identified 25 contributory factors in confined space accidents that were causal factors outside of the original Human Factors Analysis and Classification System framework. Therefore, modifications were made to deal with factors outside the organization and newly explored causal factors at the organizational level. External Influences as the fifth level considered contributory factors beyond the organization including Laws, Regulations and Standards, Government Policies, Political Influences, and Economic Status categories. Moreover, Contracting/Contract Management and Emergency Management were two extra categories identified at the organizational level.

Conclusions

Preventing confined space accidents requires addressing issues from the organizational to operator level and external influences beyond the organization. The recommended modifications provide a basis for accident investigation and risk analysis, which may be applicable across a broad range of industries and accident types.

Keywords: Accidents; Confined space; Content analysis; HFACS; Semistructured interview

Andréia Carneiro, Diego Viana-Gomes, Janaina Macedo-da-Silva, Giscard Humberto Oliveira Lima, Simone Mitri, Sergio Rabello Alves, Alexander Kolliari-Turner, Edmar Zanoteli, Francisco Radler de Aquino Neto, Giuseppe Palmisano, João Bosco Pesquero, Josino Costa Moreira, Marcos Dias Pereira,

Risk factors and future directions for preventing and diagnosing exertional rhabdomyolysis, Neuromuscular Disorders,

Volume 31, Issue 7,

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https://doi.org/10.1016/j.nmd.2021.04.007.

(https://www.sciencedirect.com/science/article/pii/S0960896621001218)

Abstract: Exertional rhabdomyolysis may occur when an individual is subjected to strenuous physical exercise. It is occasionally associated with myoglobinuria (i.e. “cola-colored” urine) alongside muscle pain and weakness. The pathophysiology of exertional rhabdomyolysis involves striated muscle damage and the release of cellular components into extracellular fluid and bloodstream. This can cause acute renal failure, electrolyte abnormalities, arrhythmias and potentially death. Exertional rhabdomyolysis is observed in high-performance athletes who are subjected to intense, repetitive and/or prolonged exercise but is also observed in untrained individuals and highly trained or elite groups of military personnel. Several risk factors have been reported to increase the likelihood of the condition in athletes, including: viral infection, drug and alcohol abuse, exercise in intensely hot and humid environments, genetic polymorphisms (e.g. sickle cell trait and McArdle disease) and epigenetic modifications. This article reviews several of these risk factors and proposes screening protocols to identify individual susceptibility to

exertional rhabdomyolysis as well as the relevance of proteomics for the evaluation of potential biomarkers of muscle damage.

Keywords: Exertional rhabdomyolysis; Risk factors; Genetic polymorphisms; Acute renal failure; Military personnel; Epigenetics; Proteomics

Francesco Longo, Antonio Padovano, Letizia Nicoletti, Caterina Fusto, Mohaiad Elbasheer, Rafael Diaz,

Fuzzy Cognitive Map-Based Knowledge Representation of Hazardous Industrial Operations,

Procedia Computer Science,

Volume 180,

2021,

Pages 1042-1048,

ISSN 1877-0509,

https://doi.org/10.1016/j.procs.2021.01.351.

(https://www.sciencedirect.com/science/article/pii/S1877050921004051)

Abstract: Hazardous industrial operations are highly stochastic, still human-dependent, and risky. Operators working in such an environment must understand the complex interrelation between several factors contributing to safe and effective operations. Therefore, being able to predict the effects of their actions on provoking or mitigating possible accidents is crucial. This study aims to utilize fuzzy cognitive maps (FCM) to model the expert's reasoning about occupational health and safety (OHS) in confined space. This knowledge is used by operators to build their mental models. The developed FCM displays all the possible incidents of a confined space and links these incidents with all their causing and preventing factors. This approach may facilitate the

development of simulation-based training solutions and allow operators to act proactively during the operation.

Keywords: Fuzzy cognitive maps; knowledge representation; hazardous industrial operations; occupational health; safety; confined space

Bo-Hyun Kim, Mark K. Larson,

Laboratory investigation of the anisotropic confinement-dependent brittle-ductile transition of a Utah coal,

International Journal of Mining Science and Technology,

Volume 31, Issue 1,

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Pages 51-57,

ISSN 2095-2686,

https://doi.org/10.1016/j.ijmst.2020.12.017.

(https://www.sciencedirect.com/science/article/pii/S2095268620309514)

Abstract: This paper was developed as part of an effort by the National Institute for Occupational Safety and Health (NIOSH) to identify risk factors associated with bumps in the prevention of fatalities and accidents in highly stressed, bump-prone ground conditions. Changes of failure mechanism with increasing confinement, from extensional-to shear-dominated failure, are widely observed in the rupture of intact specimens at the laboratory scale and in rock masses. In the previous analysis conducted in 2018, both unconfined and triaxial compressive tests were conducted to investigate the strength characteristics of some specimens of a Utah coal, including the spalling limits, the ratio of apparent unconfined compressive strength (AUCS) to unconfined compressive strength (UCS), the damage characteristics, and the post-yield dilatancy. These

mechanical characteristics were found to be strongly anisotropic as a function of the orientation of the cleats relative to the loading direction. However, the transition from extensional to shear failure at the given confinements was not clearly identified. In this study, a total of 20 specimens were additionally prepared from the same coal sample used in the previous study and then tested under both unconfined and triaxial compressive conditions. The different confining stresses are used as analogs for different width-to-height (W/H) ratios of pillar strength. Although the W/H ratios of the specimens were not directly considered during testing, the equivalent W/H ratios of a pillar as a function of the confining stresses were estimated using an existing empirical solution. According to this relationship, the W/H at which in-situ pillar behavior would be expected to transition from brittle to ductile is identified.

Keywords: Bump-prone ground conditions; A Utah coal; Anisotropic; Equivalent W/H ratios of a pillar

Muhammad Khan, Rabia Khalid, Sharjeel Anjum, Numan Khan, Seungwon Cho, Chansik Park, Tag and IoT based safety hook monitoring for prevention of falls from height,

Automation in Construction,

Volume 136,

2022,

104153,

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https://doi.org/10.1016/j.autcon.2022.104153.

(https://www.sciencedirect.com/science/article/pii/S0926580522000267)

Abstract: Monitoring the unsafe behavior of construction workers at risky elevations is essential for eliminating fall from height (FFH) accidents. This study aims to bridge the gap between

technological advancements and their application in the construction industry by introducing real-time hybrid vision- and IoT-based systems for safety engineers to monitor the use of safety hooks at risky elevations in real-time. The proposed system for hybrid smart safety hooks (HSSH) integrates three components: 1) vision (AprilTag detection) and IoT sensors (IMU and Altimeter) based monitoring systems, 2) web-based management platform (WBMP), and 3) backend cloud server (BCS) storage system. The proposed system aims to help safety managers by efficiently automating multiple workers' safety monitoring in real-time at the complex construction sites where performing a hazardous activity at a risk height may lead to FFH fatality. WBMP system provides a mode of communication and visualization, whereas BCS records the behavior of every worker, facilitating mitigative planning by safety engineers. The proposed HSSH system enhanced the performance of the SSH and the feasibility of deployment at real construction sites. Future research will involve the extensive integration of sensors for detailed insights of workers exposed to other hazards during construction.

Keywords: Fall from height (FFH); Construction accidents; Tag and IoT-based monitoring; Safety management; Internet of things (IoT); Computer vision; Smart Safety Hook (SSH); Worker safety; Safety monitoring

Peng Cui, Gabriella Schito, Qingbin Cui,

VOC emissions from asphalt pavement and health risks to construction workers,

Journal of Cleaner Production,

Volume 244,

2020,

118757,

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https://doi.org/10.1016/j.jclepro.2019.118757.

(https://www.sciencedirect.com/science/article/pii/S0959652619336273)

Abstract: Hot Mix Asphalt (HMA) is used in the construction of highway roads, parking lots and other pavement repairs in the US and worldwide. During asphalt pavement installation, a large amount of asphalt fume containing volatile organic compounds (VOCs) is emitted, causing potential health risks to construction workers. The field data investigation in this paper reports the concentration of VOCs around the workers on site using the Photo Ionization Detection (PID) device. Additionally, this paper presents a health risk evaluation model based on the Monte Carlo simulation to assess the carcinogenic and non-carcinogenic risks of workers during pavement construction. More specifically, distribution and sensitivity analyses illustrate the factors that pose the greatest health risks caused by certain VOCs. The study calls for better health risk controls by targeting the emission sources, propagating pathways, and individual receptors of the VOCs to protect workers' health during pavement construction. This paper contributes to the knowledge of VOCs generated from HMA and the potential health risks to construction workers, as well as suggests the implementation of new requirements for pavement construction codes and safety regulations.

Keywords: VOCs; Asphalt pavement; Health risk; Construction; Monte Carlo

Mariusz Szóstak, Bożena Hoła, Paweł Bogusławski,

Identification of accident scenarios involving scaffolding,

Automation in Construction,

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https://doi.org/10.1016/j.autcon.2021.103690.

(https://www.sciencedirect.com/science/article/pii/S0926580521001412)

Abstract: The aim of the undertaken research was to identify the most frequently repeated accident scenarios in relation to accidents that involve scaffolding. The source of knowledge was accident documentation containing information on the circumstances of accidents, as well as their course and consequences. As part of the research, an IT Database (ITD) was developed, which involved accidents that occurred in Poland over the past five years which were related to work on scaffolding. An original graphical, mathematical and IT process model was developed in order to enable a large set of accidents involving construction scaffolding to be studied. Due to the fact that every accident proceeds according to a different scenario, a map of possible accident scenarios was developed and presented in the form of a directed graph. Graph algorithms, including the Dijkstra algorithm, were used to build the IT model. Based on the information contained in the ITD, the course of the accident sequence was analysed in the proposed graph. The most probable accident scenarios, the probability of their occurrence, and the course of the critical path were determined. The obtained results constitute a starting point for estimating the occupational risk associated with working on scaffoldings.

Keywords: Construction; Scaffolding; Fall from height; Accident scenario; Direct graph; Dijkstra algorithm; Process model

Cenk Sakar, Muge Buber, Burak Koseoglu, Ali C. Toz,

Risk analysis for confined space accidents onboard ship using fuzzy bow-tie methodology,

Ocean Engineering,

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(https://www.sciencedirect.com/science/article/pii/S002980182201678X)

Abstract: Confined spaces pose a number of physical and environmental hazards to workers. Risks associated with confined spaces are one of the leading causes of loss of life on board. Therefore, risk assessment is vital to the seafarer's life. In this context, the principal aim of this research is to analyze the risks associated with works in confined spaces on-board through an integrated model. To do this, a fuzzy based bow-tie methodology was performed to identify the causes and the potential consequences of the unsafe confined space operations. The study found that E3 (commercial/time pressure) with probability 9.595E-01 has the highest impact on the top event. The results also indicate that, macro-level revisions such as improvements in industry practices, changes in organizational culture, redefining roles and responsibilities are critical to minimize the potential of recurrence of such accidents. This study makes a significant contribution to the relevant literature as one of the few pieces of research using the combined FTA-ETA as a dynamic risk analysis methodology. In addition to its contribution to knowledge, this study provides vital information to safety operators. Thus, the findings are valuable for developing risk reduction strategies for unsafe confined space operations. Furthermore, it is recommended to use other risk analysis tools and consider rescue operations for further research.

Keywords: Confined space; Fuzzy bow-tie; Ship accident; Risk analysis

Kathryn Taylor, Susan Thomas, Diana Mendez, Catherine Chicken, Joan Carrick, Jane Heller, David Durrheim,

“Prevention is the biggest success”: Barriers and enablers to personal biosecurity in the thoroughbred breeding industry,

Preventive Veterinary Medicine,

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105135,

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(https://www.sciencedirect.com/science/article/pii/S0167587719306944)

Abstract: Employees in the equine industry are at occupational risk of zoonoses such as Hendra virus and equine chlamydiosis through exposure to infected materials. This study aimed to gain a deeper understanding of the views and experiences of employees, and the key drivers of infection control and personal biosecurity (PB) practices in the Thoroughbred breeding industry. Methods: An exploratory qualitative study was conducted in 2018 in New South Wales, Australia using interviews (9) and small group discussions (7). The 29 participants included veterinarians, veterinary nurses, foaling staff, stud managers and laboratory personnel working in a range of equine medicine settings. Interviews and focus groups were recorded, transcribed and analysed manually by at least two members of the research team. An iterative approach was used to derive themes. Results: Five main themes emerged: (i) greater awareness of current and emerging infectious risks promotes use of Personal Protective Equipment (PPE); (ii) currently available PPE is not comfortable, practical or well-suited to equine reproductive work in Australia’s hot climate; (iii) creating supportive environments for PB reduces risk of exposure to infectious materials; (iv) strong leadership is required to implement sustainable change in workplace culture and practices; and (v) policy and economic factors play an important role in adopting biosecurity

(BS) and PB measures in the workplace. Personnel working in the Australian Thoroughbred breeding industry face unique zoonotic risks in a challenging physical environment. A qualitative approach provided rich insights into social and physical factors motivating BS and PB in this occupational group. There is an opportunity for collaboration between Public Health services and industry partners to develop and implement strategies most likely to be effective in ensuring consistent uptake of PB measures in the workplace.

Keywords: Equine; Public health; Infection prevention and control; Biosecurity; Zoonoses; Occupational health

Mohammad Tanvi Newaz, Mahmoud Ershadi, Luke Carothers, Marcus Jefferies, Peter Davis,
A review and assessment of technologies for addressing the risk of falling from height on construction sites,
Safety Science,
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(https://www.sciencedirect.com/science/article/pii/S0925753521004586)

Abstract: Falling from height (FFH) is blamed for causing significant injuries and deaths on construction sites. Previous research has outlined a broad range of technological advances facilitating the management of the FFH safety risk. However, the extant literature lacks a comprehensive assessment to investigate the contribution of various FFH technologies, as well as their implementation feasibility on construction sites, which provides rationale for this study. The

study aims to assess recent safety technologies which can be used to control the risk of FFH on construction sites, especially in urban building construction projects. A scoping review was conducted to identify such technologies and provide insight into their application in the construction industry. As a result of searching Scopus, Web of Science, and Google Scholar databases between 2010 and 2021, a total of 86 representative studies were selected and reviewed. Following this stage, an assessment of their feasibility was carried out based on a set of criteria from the literature. A total of 7 FFH technologies were identified, characterising the contribution of recent technologies to the prediction, prevention, and mitigation of FFH risks. These technologies include (1) Safety risk assessment and propagation, (2) real-time sensing and monitoring, (3) automated prevention through design, (4) ontology and knowledge modelling, (5) virtual reality for FFH training, (6) personal fall arrest systems, and (7) collective fall protection systems. This research contributes to an improved understanding of the status of FFH technologies. The feasibility assessment provides insight into suitable technologies for construction projects of various sizes and features.

Keywords: Falling from height; Safety technology; Construction industry; Feasibility assessment

Mehdi Jahangiri, Hamid Reza Jamshidi Solukloei, Mojtaba Kamalinia,

A neuro-fuzzy risk prediction methodology for falling from scaffold,

Safety Science,

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2019,

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(https://www.sciencedirect.com/science/article/pii/S0925753518311196)

Abstract: Fall from height is one of the most significant safety issues in the construction industry, due to the high number of fatal injuries. Scaffolds are a leading cause and have one of the highest injury rates. Therefore, it is crucial to introduce preventive measures and strategies. This study introduces a hybrid approach that merges an Adaptive Neural Network-based Fuzzy Inference System (ANFIS) and a safety inspection checklist to identify risk factors and predict the risk of falling from scaffold on construction sites. Our findings indicate that platform, joints, ladders, personal protective equipment and guardrails are the most important factors. The approach can identify and assess key conditions and situations that have the greatest impact on fall risk. The hybrid ANFIS–checklist model is found to outperform the regression method in predicting fall risk. Experts can use also this approach in other safety areas to identify and predict workplace risk.

Keywords: Risk of fall; Scaffold; Neuro-fuzzy modeling; Prediction

Yahia Halabi, Hu Xu, Danbing Long, Yuhang Chen, Zhixiang Yu, Fares Alhaek, Wael Alhaddad,

Causal factors and risk assessment of fall accidents in the U.S. construction industry: A comprehensive data analysis (2000–2020),

Safety Science,

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105537,

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(https://www.sciencedirect.com/science/article/pii/S0925753521003805)

Abstract: This study delves into investigating the leading factors of occurring 23,057 fall accidents in the United States construction industry over 20 years (1/2000–8/2020) recorded in the Occupational Safety and Health Administration (OSHA) database. Additionally, the contributions are elicited in terms of diverse dimensions of fall accident, such as project type, construction end-use, work activity, worker's occupation and age, fall location and height, accident time, injury degree, and fall protection. The data is analysed using frequency analysis to obtain the trends of fall accidents, correlation analysis between the accident factors and the injury degree, and logistic regression analysis to establish a prediction model that can diagnose fatal and nonfatal accidents. The results emphasized that the proportion of fall accidents increased substantially, and there was egregious evidence that the usage of fall protection has no considerable improvement. Besides, most of the fall accidents were (1) from heights<9.15 m, (2) among the roofers, (3) occurring on new commercial buildings and residential projects with low cost, (4) during the time intervals 10:00–12:00 and 13:00–15:00, (5) among older workers which alert that the experience might not be enough to diminish the accident. The correlation analysis revealed the fall factors that were significantly associated with the injury degree. Subsequently, a logistic regression model was done to predict the injury outcome (fatal/nonfatal). It was found that the prediction model could correctly diagnose the injury degree outcome by 77.7% depending on the selected predictors of the fall accident. Furthermore, the odds of reporting fatal or nonfatal accidents from the prominent factors of fall were calculated, enhancing the risk assessment to avoid the implications of falls. This study might encourage the safety managers to apply proactive and preparedness procedures for reducing fall accidents and prioritize risks according to the likelihood of fall risk and injury characteristics by applying appropriate safety regulations.

Keywords: Fall accidents; Accident prevention; Trends analysis; Logistic regression; Project management; Safety monitoring; Risk assessment

Janet S. Baum, Amie E. Norton,

In Your Face: Consideration of higher risks for chemical exposure to persons with disabilities in laboratories,

Journal of Chemical Health and Safety,

Volume 26, Issue 6,

2019,

Pages 45-64,

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https://doi.org/10.1016/j.jchas.2019.05.006.

(https://www.sciencedirect.com/science/article/pii/S1871553219300519)

Abstract: Workforce diversity is seen to have a competitive advantage over organizations that are not diverse. It is observed that these organizations have advantages in creativity, problem-solving, decision-making, and overall quality of results, among other observed outcomes. The Americans with Disabilities Act of 1990, passed nearly 30 years ago, opens doors for people with disabilities to enter the workforce. While many under-represented groups are increasing participation, such as women, participation of people with disabilities remains static. This article focuses only on mobility and motor impairments or physical difficulties that could put individuals with disabilities at greater risk of exposures from hazardous chemicals while working in laboratories. Dosage experienced is potentially greater in people who are below the historical standard chemical fume hood testing height of 178cm (70inches). Ergonomic concepts and anthropometric adult-measurement data can help OH&S, IH, EH&S professionals to investigate

and mitigate physical conditions in laboratories that could increase exposure risks of hazardous fumes, vapors, and airborne particulate to persons who use wheelchairs or who must be seated while operating chemical fume hoods and working at open benches. More exposure tests need to be conducted to assess risks for able and disabled laboratory science workers and students in STEM disciplines. Chemical fume hood testing protocols and certification may need further amendments to acknowledge the data generated and validated in exposure research that includes critical ergonomic factors.

Mohammad Nasr, Fatemeh Rahimian, Samira Rahmanian, Fereshteh Aliasghari, Esmaeel Soleimani, Mohammad Aryaei, Hadi Daneshmandi,
Lipid profile and fast blood glucose in office workers: BMI and sex differences,
Obesity Medicine,
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2022,
100412,
ISSN 2451-8476,
https://doi.org/10.1016/j.obmed.2022.100412.
(https://www.sciencedirect.com/science/article/pii/S2451847622000240)
Abstract: Aim
Office workers spend the majority of their working time in sedentary positions which put them at a higher risk of obesity and cardiovascular diseases. The present study was performed to assess the relationship between sex and body mass index (BMI) with the parameters of lipid profile and FBS in a group of office workers.
Methods

Five hundred and six office workers were studied. A questionnaire on demographic variables, smoking habits, alcohol consumption, consumption of dairy products, vegetables, and oils, and detailed occupational history was completed. The standing height and weight of the participants were measured. Fasting blood samples were taken and parameters of lipid profile and fast blood sugar (FBS) were measured. Data were analyzed using version 21.0 of the SPSS software.

Results

About 64% of the subjects were overweight/obese. The prevalence of overweight/obesity was not different between males and females. Male participants and overweight/obese participants had significantly higher TG and FBS and lower HDL than the females and those with normal BEI, respectively. No statistically significant differences were observed in the means of lipid profile parameters and FBS between smoker and nonsmoker participants and between those with different consumption of dairy products or vegetables. The most prevalent abnormal findings were observed for LDL (52%), HDL (40%), TG (26%), TC (21%), and FBC (15%), respectively.

Conclusions

BMI and male sex were directly associated with TG and FBS and inversely associated with HDL. Neither sex nor BMI was associated with LDL.

Keywords: Office workers; Sex; Body mass index; Cholesterol; Triglyceride; Blood glucose

Abderrahim Zermane, Mohd Zahirasri Mohd Tohir, Mohd Rafee Baharudin, Hamdan Mohamed Yusoff,

Risk assessment of fatal accidents due to work at heights activities using fault tree analysis: Case study in Malaysia,

Safety Science,

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(https://www.sciencedirect.com/science/article/pii/S0925753522000649)

Abstract: Fatal falls from heights accidents represent a threat to any industry's development and progress. It is crucial to understand how these accidents evolve from a simple 'near miss' into a 'fatal accident'. In recent years, Malaysia's construction industry suffered an increasingly alarming number of fatal falls from heights accidents. Fatal accident numbers that were reported and investigated had a noticeable increase from 2013 to 2017. The purpose of this study is to assess the risks associated with falls from heights fatal accidents, which ultimately will be able to help provide the data for proactive prevention against this type of accident. This study used two different risk assessment methods. The first risk assessment consists of a statistical analysis of the collected data. The second risk assessment includes a fault tree analysis. Data extracted from the Department of Occupational Safety and Health Malaysia were used as input for the risk assessment. Results indicate several significant causes that need to be handled immediately. Some of these causes are failure to wear Personal Protective Equipment with an 85.93% occurrence rate, the lack of supervision and leadership with 89.84%, and the absence of work standards or the inability to follow them correctly with 85.15%. This study will help identify root causes, immediate causes, accidents scenarios, and finally the probability and urgency when investigating fatal falls from heights.

Keywords: Construction safety; Fall from height; Fault tree analysis; Statistical analysis; Malaysia; Occupational health and safety

Stefano Errico, Martina Drommi, Valentina Calamano, Rosario Barranco, Giulia Molinari, Francesco Ventura,
Fatal work-related injuries in the Genoa district (North-Western Italy): Forensic analysis of the 10-year period between 2011 and 2020,
Journal of Forensic and Legal Medicine,
Volume 85,
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102294,
ISSN 1752-928X,
https://doi.org/10.1016/j.jflm.2021.102294.
(https://www.sciencedirect.com/science/article/pii/S1752928X21001797)
Abstract: According to the ILO (International Labor Organization), an occupational accident is that which occurs in the course of work and results in either a fatal or non-fatal injury. Occupational-related deaths are increasingly a concerning issue, also worldwide, with severe social repercussions: it is clear that when a person loses their life, it has a permanent impact on all their family, as well as incurring direct and indirect costs for employers, workers and the community at large. The aim of the present retrospective-observational study is to investigate, from an autoptic and forensic point of view, the characteristics of occupational-related deaths of victims received between the 10-year period of 2011–2020 by the Municipal Morgue of Genoa, which forms part of the Institute of Forensic and Legal Medicine, for the purpose of providing a Forensic and Coroner's overview of this important phenomenon. The study comprises of a list of 47 people who died as a result of an occupational injury: 46 males and 1 female. It was observed that workers in the construction and steel manufacturing industries were in the category most at risk of fatal accidents (40.5%). In 41 cases (87.2%), death was related to major mechanical

trauma, from falling from a height (42.5%) objects falling directly onto the victim (38.3%) and lastly, from pedestrian road accidents (6.4%). Fatal head traumas with endocranial haemorrhage accounted for deaths in 23 of all the cases studied (63.4%). As shown in our study, death in the workplace is still today having to be considered as an important social issue and it is still necessary to improve the workers' knowledge of the related hazards and risks involved at work, together with preventative procedures. An in-depth analysis of such risks in the workplace, as well as the monitoring and training of workers is fundamental if we are to achieve an overall improvement in working conditions.

Keywords: Work accident; Fatal injury; Mechanical trauma; Autopsy; Forensic pathology

Nai-Tzu Chen, Yu-Cheng Chen, Chih-Da Wu, Mu-Jean Chen, Yue-Liang Guo,
The impact of heavy precipitation and its impact modifiers on shigellosis occurrence during typhoon season in Taiwan: A case-crossover design,
Science of The Total Environment,
Volume 848,
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157520,
ISSN 0048-9697,
https://doi.org/10.1016/j.scitotenv.2022.157520.
(https://www.sciencedirect.com/science/article/pii/S0048969722046186)

Abstract: Because of climate change, heavy precipitation is likely to become frequent and intense, thereby increasing the risk of shigellosis occurrence. However, few studies examined the impact of heavy precipitation on shigellosis and its impact modifiers in developed countries. This study aims to analyze the association between heavy precipitation and shigellosis in Taiwan, and

to identify the vulnerable population and impact modifiers. We adopted a case-crossover design, and used conditional logistic regression to estimate odds ratios (ORs) for shigellosis occurrence. Information were collected on the daily shigellosis cases, precipitation, temperature, and typhoons from 1994 to 2015, and yearly data of medical resources and environmental factors were obtained at the city level from 1998 to 2015. Stratification analyses were performed by age, sex, medical resource, and environmental factors. We discovered that heavy precipitation ≥80 mm/day considerably increased the risk of shigellosis occurrence. The ORs of heavy rain (80 to <200 mm/day) were 2.08–2.26 at lags 0–1. The ORs of extremely heavy rain (≥200 mm/day) increased to 2.17–4.73 at lags 5–8. Moreover, the effect of heavy precipitation was greater under high temperature condition (≥23.6 °C). Adults were more susceptible to heavy-precipitation-associated shigellosis, especially the elderly. Males experienced marginally higher effects than females did. Moreover, cities with more medical resources and forest cover and higher percentage of completed storm sewers had lower effects; however, dense population and higher pig density were the risk factors. Although the high water-supply penetration rate did not decrease Shigella infection after heavy precipitation, it did lower the risk of typhoon-related shigellosis. In conclusion, hot temperature could enhance the impact of heavy precipitation on shigellosis. Public health interventions should be introduced according to the lag period after heavy precipitation, particularly in areas with high population density, proportion of elderly people, and pig density. The improvement of medical resources and tree cover as well as the construction of storm sewers and piped water systems might be mitigation measures that can be considered.

Keywords: Heavy precipitation; Shigellosis; Medical resource; Environmental factor; Case-crossover

Danyela Samaniego-Rascón, Manuel C. Gameiro da Silva, Almerindo D. Ferreira, Rafael E. Cabanillas-Lopez,

Solar energy industry workers under climate change: A risk assessment of the level of heat stress experienced by a worker based on measured data,

Safety Science,

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https://doi.org/10.1016/j.ssci.2019.04.042.

(https://www.sciencedirect.com/science/article/pii/S0925753518309561)

Abstract: Due to production requirements, solar facilities are usually located in sunny environments where workers face hot weather. Heat is seen as an environmental and occupational hazard with its physiological effects due to high-temperature exposures. Among the heat-related effects are, dehydration, heat exhaustion, heat stroke, and death. The heat-related impairments on health could also negatively impact the performance of the workers and simultaneously, decrease their productivity. While climate change the already known effects on health could become more frequent, prevalent, and spread. The present investigation provides an analysis of the level of heat stress experienced by a worker based on Wet-bulb Globe Temperature measurements. The study was conducted at a solar energy facility in Mexico. The results show that sometimes workers develop their tasks under conditions above the alert limits of exposure. Solar workers without acclimatization and heavy workload requirements (400 kcal/h) need to rest 75% from an hour and 50% when the workload is moderate (300 kcal/h). Consequently, the percentage of work capacity was established for different scenarios. The period of risk alert during a recorded heat wave,

where the worker would mainly require to stop all the physical activities, started at 6:30 am and ended at 6:50 pm. In the final section, preventive measures are suggested. This research aims to contribute with information directed to environmental scientists, standard/policy developers and the solar industry that could improve/develop safety procedures directed toward the heat-related occupational health and safety within solar energy applications under the climate change conditions.

Keywords: Climate change; Solar energy; Heat stress; Heat wave; Occupational health and safety; Climatic health hazardsJodi Oakman, Rwth Stuckey, Natasha Kinsman,
Using evidence to support the design of submarine control console workstations,
Applied Ergonomics,
Volume 79,
2019,
Pages 54-65,
ISSN 0003-6870,
https://doi.org/10.1016/j.apergo.2019.04.006.
(https://www.sciencedirect.com/science/article/pii/S0003687018306331)

Abstract: Purpose

This paper outlines an approach to develop practical guidelines to support the design of submarine control console workstations.

Method

Guideline development was undertaken for 13 physical design criteria, provided to the research team. Data was gathered from four sources: a systematic literature review, relevant standards, population specific anthropometric data, and user focus groups. The systematic review included risk of bias, quality assessment and evidence synthesis.

Results & Conclusion

The systematic review retrieved 43 relevant articles in relation to seven of the 13 design criteria. Very few high-quality studies were identified. The combined evidence available from each of the four data sources was collated and used to provide a set of guidelines for each of the 13 criteria, highlighting the importance of the use of multiple data sources. This approach has applicability beyond this study where the need exists to collate evidence sources beyond the scientific literature.

Keywords: Guidelines; Workstation; Musculoskeletal disorders; Submarines; Systematic review

Karin Brolin, Daniel Lanner, Peter Halldin,

Work-related traumatic brain injury in the construction industry in Sweden and Germany,

Safety Science,

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(https://www.sciencedirect.com/science/article/pii/S0925753520305439)

Abstract: Work-related traumatic brain injuries (wrTBIs) in the construction industry have been studied in North America but, to the best of our knowledge, not in Europe. This study analyzed sets of public data on head injuries occurring in the construction industry from the workers' compensation systems in Sweden and Germany, 2014 – 2018. The ratio of wrTBI varied from 11% to 61% of all head injuries, with higher ratios for more severe injuries. The average yearly incidence (per 100,000 FTE) of wrTBI resulting in more than four days absence from work was

nine in Sweden and 117 in Germany, as compared to 22–212 in North American studies. A limitation of studies based on workers' compensation claims is that they underestimate the true burden of wrTBI. The most frequent events leading to wrTBI were falls, followed by loss of control, failure of material agents, and body movements without stress. Falls from a height caused 35% of all wrTBI with more than 14 days off work in Sweden and 57% of all new injury pensions granted in Germany. In North American studies, 52–78% of the wrTBI were caused by falls. This highlights the relevance of fall safety measures to reduce wrTBI in the construction industry, such as avoiding work at heights, use of safety nets, education, and etcetera. The energy absorption of safety helmets mainly protects the head excluding face of which 49–62% were wrTBI, indicating that helmet testing standards should evaluate protection against TBI as well as skull fractures.

Keywords: Traumatic brain injury; Construction; Occupation; Epidemiology; Falls; Helmet standards

Stéphane Jouneau, Mallorie Kerjouan, Chloé Rousseau, Mathieu Lederlin, Francisco Llamas-Guttierez, Bertrand De Latour, Stéphanie Guillot, Laurent Vernhet, Benoit Desrues, Ronan Thibault,

What are the best indicators to assess malnutrition in idiopathic pulmonary fibrosis patients? A cross-sectional study in a referral center,

Nutrition,

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https://doi.org/10.1016/j.nut.2018.12.008.

(https://www.sciencedirect.com/science/article/pii/S0899900718301928)

Abstract: Objectives

Little is known about the indicators to assess malnutrition in patients with idiopathic pulmonary fibrosis (IPF). This study aimed to determine the following: 1) the prevalence of malnutrition in IPF patients; 2) the nutritional indicators predictive of low fat-free mass (FFM) as measured by bioimpedance analysis; 3) the IPF patients' characteristics associated with low FFM.

Methods

The IPF patients were consecutively recruited in a referral center for rare pulmonary diseases. Malnutrition was defined as a fat-free mass index (FFMI) = FFM (kg) / (height [m]2) <17 (men) or <15 (women). Nutritional assessment included body mass index (BMI), mid-arm circumference (MAC), triceps skinfold thickness, analogue food intake scale, and serum albumin and transthyretin. The primary endpoint was FFMI. Area under the receiver operating characteristic curve (AUC) assessed low FFMI prediction from nutritional indicators. Multivariable logistic regression determined variables associated with low FFMI.

Results

Eighty-one patients were consecutively recruited. Low FFMI prevalence was 28% (23 of 81). BMI AUC was 0.91 (95% confidence interval [CI], 0.84–0.97) and MAC AUC was 0.85 (0.76–0.94). Multivariable analysis associated BMI (odds ratio [OR] 0.26 [95% CI, 0.12–0.54], P = 0.0003), male sex (OR 0.02 [0.00–0.33], P = 0.005), and smoking (OR 0.10 [0.01–0.75], P = 0.024) with a lower risk of malnutrition.

Conclusions

Malnutrition occurred in nearly one-third of IPF patients. Malnutrition screening should become systematic based on BMI and MAC, which are good clinical indicators of low FFMI. We propose a practical approach to screen malnutrition in IPF patients.

Keywords: Malnutrition; Lean body mass; Food intake; Bioelectrical impedance analysis; Interstitial lung disease

Jessica Sexton, Christine Andrews, Selina Carruthers, Sailesh Kumar, Vicki Flenady, Scott Lieske,

Systematic review of ambient temperature exposure during pregnancy and stillbirth: Methods and evidence,

Environmental Research,

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111037,

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(https://www.sciencedirect.com/science/article/pii/S0013935121003315)

Abstract: Background

Associations between ambient temperature exposure during pregnancy and stillbirth have been reviewed and described in the literature. However, there is no existing review of environmental and epidemiologic methods applied to measure stillbirths resulting from exposure to ambient temperatures during pregnancy. The objective of this study is to systematically review published methods, data sources, and data linkage practices to characterize associations between ambient temperature and stillbirth to inform stillbirth prevention and risk management strategies.

Methods

A systematic review of published studies that assess the association between ambient temperature exposure during pregnancy using any measures or approach and stillbirth was undertaken in Cochrane Library, PubMed, Medline, Scopus, Embase, and Web of Science of studies (2000–2020, inclusive). Selection of studies were assessed by pre-specified eligibility criteria and documented using PRISMA. Citations were managed using EndNote X8 whilst selection, reviewing, and data extraction were performed using Covidence. The screening, selection, and data extraction process consisted of two blind, independent reviews followed by a tertiary independent review. An adapted Critical Appraisal Skills Program (CASP) checklist was used to assess quality and bias. The main findings and characteristics of all studies was extracted and summarized. Where appropriate, a meta-analysis will be performed for measures of association.

Results

Among 538 original records, 12 eligible articles were identified that analysed associations between ambient temperature exposure and stillbirth for 42,848 stillbirths among 3.4 million births across seven countries. Varied definitions of stillbirth were reported based on gestational age, birthweight, both, or neither. The overall rate of stillbirth ranged from 1.9 to 38.4 per 1000 among six high-income countries and one low-middle-income country. All study designs were retrospective and included ten cohort studies, three case-crossover studies, and two additional case-control subgroup analysis. Exposure data for ambient temperature was mostly derived from standard municipal or country-level monitors based on weather stations (66.6%) or a forecasting model (16.7%); otherwise, not reported (16.7%). Results were not statistically pooled for a meta-analysis due to heterogeneity of methods and models among included studies. All studies reported associations of increased risk of stillbirth with ambient temperature exposures throughout pregnancy, particularly in late pregnancy. One study estimates 17–19% (PAR) of

stillbirths are potentially attributable to chronic exposure to hot and cold ambient temperatures during pregnancy. Overall, risk of stillbirth was observed to increase below 15 °C and above 23.4 °C, where highest risk is above 29.4 °C.

Conclusion

Exposure to hot and cold temperatures during pregnancy may increase the risk of stillbirth, although a clear causative mechanism remains unknown. Despite lack of causal evidence, existing evidence across diverse settings observed similar effects of increased risk of stillbirth using a variety of statistical and methodological approaches for exposure assessments, exposure windows, and data linkage. Managing exposure to ambient temperatures during pregnancy could potentially decrease risk of stillbirth, particularly among women in low-resource settings where access to safe antenatal and obstetric care is challenging. To fully understand the effects or dose-response relationship of maternal exposure to ambient temperatures and stillbirth, future studies should focus on biological mechanisms and contributing factors in addition to improving measurement of ambient temperature exposure.

Keywords: Stillbirth; Fetal death; Ambient temperature

Hayley Barnes, Jesse Lu, Ian Glaspole, Harold R. Collard, Kerri A. Johannson,
Exposures and associations with clinical phenotypes in hypersensitivity pneumonitis: A scoping review,
Respiratory Medicine,
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(https://www.sciencedirect.com/science/article/pii/S0954611121001505)

Abstract: Antigen identification is important for establishing a confident diagnosis of hypersensitivity pneumonitis (HP). There are no systematically curated lists of HP-associated exposures that inform clinical relevance or disease phenotype. We sought to systematically identify all reported causes of HP in the literature and evaluate their clinical relevance. A scoping review was performed to identify all publications describing HP cases and their associated exposures (even if unknown) from Jan 1990–June 2020. Frequencies of exposures and meta-analysis of proportions for registry-based studies were determined for specific exposure categories, and associations with fibrotic and non-fibrotic HP were assessed. 24,138 publications were identified, with 967 publications included in the final analysis, representing 62 unique exposures associated with HP. Certain exposures were more frequently reported than others, including birds (comprising 32% of HP cases in registry-based studies) and mould (17% registry study HP cases). Antigen-indeterminate HP comprised 15–24% of registry-based studies. Limited data found contaminated metal-working fluids, isocyanate exposure, and hot tub lung were rarely associated with fibrotic features, whereas antigen-indeterminate HP cases were more frequently associated with fibrosis. There was heterogeneity in HP case definition and how causative exposures were identified. We identified 62 unique exposures associated with HP, with specific exposures associated with clinical phenotypes. These data may inform clinical assessment and the development of questionnaires to identify antigens in the diagnostic evaluation of suspected HP.

Open sciences framework registration

osf.io/4aq5m.

Keywords: Alveolitis; Allergic extrinsic; Lung diseases; Interstitial; Farmer's lung

Jyoti Chhimwal, Vikram Patial, Yogendra Padwad,

Beverages and Non-alcoholic fatty liver disease (NAFLD): Think before you drink,

Clinical Nutrition,

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(https://www.sciencedirect.com/science/article/pii/S026156142100203X)

Abstract: Summary

Background & aims

Beverages and Non-alcoholic fatty liver disease (NAFLD) both the terms are associated with westernized diet and sedentary lifestyle. Throughout recent decades, dietary changes have boosted demand of beverages to meet the liquid consumption needs, among which rising consumption of several calorie-rich beverages have increased the risk of fatty liver disease. Meanwhile, certain beverages have capacity to deliver many unanticipated health benefits thereby reducing the burden of NAFLD and metabolic diseases. The present review therefore addresses the increasing interconnections between beverages intake among population, dietary patterns and the overall effect of these beverage on the development and prevention of NAFLD.

Methods In the present review, some frequently consumed beverage groups have been analyzed in light of their role in the advancement and prevention of NAFLD, including sugar sweetened, hot and alcoholic beverages. The nutritional composition of different beverages makes the progression of NAFLD distinctive.

Results

The ingestion of sugar-rich beverages has demonstrated the metabolic burden and in all cases, raises the risk of NAFLD, while intake of coffee and tea has decreased this risk without any significant adverse effects. In some cases, low to moderate alcohol intake has been shown to minimize the risk of advanced fibrosis and NAFLD-mortality.

Conclusion

Together, this review discusses and supports work on new dietary approaches and clinical studies to accomplish nutrition-oriented NAFLD care by improving the drinking habits.

Keywords: Beverage; NAFLD; NASH; Fibrosis; Inflammation; Sugar-sweetened beverages

Vahideh Abolhasannejad, Rostam Golmohammadi, Mohsen Aliabadi, Ali Reza Soltanian, Hassan Khotanlou, Vahid Abolhasannejad,

An image-based method for non-contact and dynamic room acoustics analysis,

Applied Acoustics,

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https://doi.org/10.1016/j.apacoust.2018.05.018.

(https://www.sciencedirect.com/science/article/pii/S0003682X17311489)

Abstract: Noise is defined as “unwanted” sound and the workers in industrial workroom are often exposed to noise. Acoustics analysis helps to evaluate and improve noise absorption of the reflecting surfaces. Acoustics treatment aims to control sound reflections within the room. This study investigated a method of dynamic room acoustics analysis in industrial workrooms which was developed using image processing and MATLAB software. This method can be used for

collecting data and calculating the noise absorption surface area, and may help to identify the acoustics index of buildings more accurately on the basis of the existing conditions. The proposed method was compared with the classical method through 82 dimensional measurements. The required tools including camera, targets, and checkerboard were installed in the site of experiment. Taking into account the distance between the camera and the fittings of interest, the required data were gathered along the two directions of the hall in order to calculate the length, width, and the height of the fittings. The captured photos in jpg format were saved on a computer and processed using suitable algorithms. To collect the data via the classical method, the data collection stage was repeated using a Laser distance meter Tajima Model F02. Based on the results obtained from dimensional analysis in the Industrial settings, the average sound absorption index measured using the new and the classical method, respectively, was 4.15 and 4.39 Sabin·m2. The intra class correlation coefficient between these two methods was 0.989 ($R2 = 0.994$). The proposed method as a measurement and monitoring instrument was accurate enough to be used for acoustic analysis of buildings and can be considered as an alternative for the classical method. This method requires less time to be performed and provides more accurate calculations, thus, it can be used to make the right decision regarding the building acoustic condition; moreover, as it is a non-contact analysis method, it can significantly protect evaluator person against the risk of accidents caused by industrial machinery.

Keywords: Room acoustic analysis; Image processing; Industrial workroom

Mouna Baklouti, Houda Ben Ayed, Hanen Maamri, Nouha Ketata, Firas Rhila, Sourour Yaich, Raouf Karray, Jihene Jdidi, Yosra Mejdoub, Mondher Kassis, Habib Feki, Jamel Dammak, Adverse effects of personnel protective equipment among first line COVID-19 healthcare professionals: A survey in Southern Tunisia,

Infection, Disease & Health,

2022,

,

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https://doi.org/10.1016/j.idh.2022.06.001.

(https://www.sciencedirect.com/science/article/pii/S2468045122000438)

Abstract: Background

Health care professionals (HCP) were obliged to wear personal protective equipment (PPE) during pandemic in order to minimize the risk of transmission of the emerging virus. The objective of the study was to estimate the prevalence of adverse effects related to the wear of PPE among HCP and to determinate their predictive factors.

Methods

This was a cross-sectional study including a representative sample of 300 randomized HCP at Hedi Chaker University Hospital Sfax, Tunisia, during the period August-September 2021. Data collection was carried out by an anonymous self-administered questionnaire.

Results

PPE related adverse effects were noted among 87 HCP with a prevalence of 57.2%. Multivariate analysis showed that factors independently associated with PPE adverse effects were female gender (Adjusted Odds Ratio (AOR) = 1.8; p = 0.048), chronic diseases (AOR = 0.29; p = 0.001) and previous infection with COVID-19 (AOR = 0.46; p = 0.004). Frequent use of bleach or other disinfection product without protection and use of hot water at work were independently associated with a high risk of adverse effects ((AOR = 2.22; p = 0.003) and (AOR = 2.83; p = 0.005), respectively). Similarly, a duration of use of PPE>4 h per day (AOR = 1.98;

p = 0.039), as well as use of visors and/or glasses (AOR = 1.84; p = 0.045) were independently associated with PPE related adverse effects.

Conclusion

The prevalence of adverse effects related to the wear of PPE was alarmingly high among HCP. Multiple risk factors were highlighted, notably professional aspects. Adequate and repetitive training for caregivers on the correct use of PPE remain essential to manage this problem.

Keywords: Adverse effects; Health care professionals; Personal protective equipment; Prevalence; Predictive factors

Weili Fang, Lieyun Ding, Hanbin Luo, Peter E.D. Love,

Falls from heights: A computer vision-based approach for safety harness detection,

Automation in Construction,

Volume 91,

2018,

Pages 53-61,

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https://doi.org/10.1016/j.autcon.2018.02.018.

(https://www.sciencedirect.com/science/article/pii/S0926580517308403)

Abstract: Falls from heights (FFH) are major contributors of injuries and deaths in construction. Yet, despite workers being made aware of the dangers associated with not wearing a safety harness, many forget or purposefully do not wear them when working at heights. To address this problem, this paper develops an automated computer vision-based method that uses two convolutional neural network (CNN) models to determine if workers are wearing their harness when performing tasks while working at heights. The algorithms developed are: (1) a Faster-R-

CNN to detect the presence of a worker; and (2) a deep CNN model to identify the harness. A database of photographs of people working at heights was created from activities undertaken on several construction projects in Wuhan, China. The database was then used to test and train the developed networks. The precision and recall rates for the Faster R-CNN were 99% and 95%, and the CNN models 80% and 98%, respectively. The results demonstrate that the developed method can accurately detect workers not wearing their harness. Thus, the computer vision-based approach developed can be used by construction and safety managers as a mechanism to proactively identify unsafe behavior and therefore take immediate action to mitigate the likelihood of a FFH occurring.

Keywords: Convolution neural network; Falls from height; Harness; Unsafe behavior

E. Lagrange, J.P. Vernoux, J. Reis, V. Palmer, W. Camu, P.S. Spencer,

An amyotrophic lateral sclerosis hot spot in the French Alps associated with genotoxic fungi,

Journal of the Neurological Sciences,

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117558,

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https://doi.org/10.1016/j.jns.2021.117558.

(https://www.sciencedirect.com/science/article/pii/S0022510X21002525)

Abstract: Between 1990 and 2018, 14 cases of amyotrophic lateral sclerosis (ALS) were diagnosed in residents of, and in visitors with second homes to, a mountainous hamlet in the French Alps. Systematic investigation revealed a socio-professional network that connected ALS cases. Genetic risk factors for ALS were excluded. Several known environmental factors were

scrutinized and eliminated, notably lead and other chemical contaminants in soil, water or home-grown vegetation used for food, radon and electromagnetic fields. Some lifestyle-related behavioral risk factors were identified: Prior to clinical onset of motor neuron disease, some patients had a high degree of athleticism and smoked tobacco. Recent investigations on site, based on a new hypothesis, showed that all patients had ingested wild mushrooms, notably poisonous False Morels. Half of the ALS cohort reported acute illness following Gyromitra gigas mushroom consumption. This finding supports the hypothesis that genotoxins of fungal origin may induce motor neuron degeneration.

Keywords: Southeast Central France, Auvergne-Rhône-Alpes; Sporadic amyotrophic lateral sclerosis; False morels; Genotoxins

Qi Zhao, Yuming Guo, Tingting Ye, Antonio Gasparrini, Shilu Tong, Ala Overcenco, Aleš Urban, Alexandra Schneider, Alireza Entezari, Ana Maria Vicedo-Cabrera, Antonella Zanobetti, Antonis Analitis, Ariana Zeka, Aurelio Tobias, Baltazar Nunes, Barrak Alahmad, Ben Armstrong, Bertil Forsberg, Shih-Chun Pan, Carmen Íñiguez, Caroline Ameling, César De la Cruz Valencia, Christofer Åström, Danny Houthuijs, Do Van Dung, Dominic Royé, Ene Indermitte, Eric Lavigne, Fatemeh Mayvaneh, Fiorella Acquaotta, Francesca de'Donato, Francesco Di Ruscio, Francesco Sera, Gabriel Carrasco-Escobar, Haidong Kan, Hans Orru, Ho Kim, Iulian-Horia Holobaca, Jan Kyselý, Joana Madureira, Joel Schwartz, Jouni J K Jaakkola, Klea Katsouyanni, Magali Hurtado Diaz, Martina S Ragettli, Masahiro Hashizume, Mathilde Pascal, Micheline de Sousa Zanotti Stagliorio Coélho, Nicolás Valdés Ortega, Niilo Ryti, Noah Scovronick, Paola Michelozzi, Patricia Matus Correa, Patrick Goodman, Paulo Hilario Nascimento Saldiva, Rosana Abrutzky, Samuel Osorio, Shilpa Rao, Simona Fratianni, Tran Ngoc

Dang, Valentina Colistro, Veronika Huber, Whanhee Lee, Xerxes Seposo, Yasushi Honda, Yue Leon Guo, Michelle L Bell, Shanshan Li,

Global, regional, and national burden of mortality associated with non-optimal ambient temperatures from 2000 to 2019: a three-stage modelling study,

The Lancet Planetary Health,

Volume 5, Issue 7,

2021,

Pages e415-e425,

ISSN 2542-5196,

https://doi.org/10.1016/S2542-5196(21)00081-4.

(https://www.sciencedirect.com/science/article/pii/S2542519621000814)

Abstract: Summary

Background

Exposure to cold or hot temperatures is associated with premature deaths. We aimed to evaluate the global, regional, and national mortality burden associated with non-optimal ambient temperatures.

Methods

In this modelling study, we collected time-series data on mortality and ambient temperatures from 750 locations in 43 countries and five meta-predictors at a grid size of 0·5° × 0·5° across the globe. A three-stage analysis strategy was used. First, the temperature–mortality association was fitted for each location by use of a time-series regression. Second, a multivariate meta-regression model was built between location-specific estimates and meta-predictors. Finally, the grid-specific temperature–mortality association between 2000 and 2019 was predicted by use of the fitted meta-regression and the grid-specific meta-predictors. Excess deaths due to non-optimal

temperatures, the ratio between annual excess deaths and all deaths of a year (the excess death ratio), and the death rate per 100 000 residents were then calculated for each grid across the world. Grids were divided according to regional groupings of the UN Statistics Division.

Findings

Globally, 5 083 173 deaths (95% empirical CI [eCI] 4 087 967–5 965 520) were associated with non-optimal temperatures per year, accounting for 9·43% (95% eCI 7·58–11·07) of all deaths (8·52% [6·19–10·47] were cold-related and 0·91% [0·56–1·36] were heat-related). There were 74 temperature-related excess deaths per 100 000 residents (95% eCI 60–87). The mortality burden varied geographically. Of all excess deaths, 2 617 322 (51·49%) occurred in Asia. Eastern Europe had the highest heat-related excess death rate and Sub-Saharan Africa had the highest cold-related excess death rate. From 2000–03 to 2016–19, the global cold-related excess death ratio changed by −0·51 percentage points (95% eCI −0·61 to −0·42) and the global heat-related excess death ratio increased by 0·21 percentage points (0·13–0·31), leading to a net reduction in the overall ratio. The largest decline in overall excess death ratio occurred in South-eastern Asia, whereas excess death ratio fluctuated in Southern Asia and Europe.

Interpretation

Non-optimal temperatures are associated with a substantial mortality burden, which varies spatiotemporally. Our findings will benefit international, national, and local communities in developing preparedness and prevention strategies to reduce weather-related impacts immediately and under climate change scenarios.

Funding

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Jalil Hasani, Saeed Erfanpoor, Abdolhalim Rajabi, Abdolrazagh Barzegar, Mahmood Khodadoost, Mohamad Afkar, Seyed Saeed Hashemi Nazari,
Spatial analysis of mortality rate of pedestrian accidents in Iran during 2012–2013,
Traffic Injury Prevention,
Volume 20, Issue 6,
2019,
Pages 636-640,
ISSN 1538-9588,
https://doi.org/10.1080/15389588.2019.1628223.
(https://www.sciencedirect.com/science/article/pii/S1538958822008530)

Abstract: Objectives: Considering the high mortality rate of pedestrians in traffic accidents in Iran, the present study aimed to determine the high-risk and low-risk areas of accidents resulting in pedestrian deaths and the spatial analysis of their mortality rates. Methods: This cross-sectional study included 4,371 deceased pedestrians reported by the Legal Medicine Organization in Iran from March 2012 to March 2013. For spatial analysis, the collected data were entered into ArcGIS software version 10.2 and a spatial map of the mortality rate was drawn according to the distribution of data in the provinces. Using this software, high-risk and low-risk areas were identified by calculating the spatial autocorrelation of the data. The Moran's index of road accident patterns was surveyed and high-risk and low-risk points were identified using the local Getis index. Results: The age-standardized incidence rate was 6.8 per 100,000. After analyzing the data using ArcGIS software, the local Moran's index showed a cluster pattern with a high mortality rate in 3 provinces of Mazandaran, Gilan, and Qazvin. In identifying high-risk and low-risk points, the local Getis index showed 3 hot spots with a confidence interval of 99% in Qom, Qazvin, and Mazandaran and 5 hot spots with a 95% confidence interval in Markazi, Tehran,

Zanjan, Gilan, and Golestan provinces. Conclusions: According to the cluster pattern of accidents in the 3 provinces and the presence of hot spots in 9 provinces, it is necessary to identify factors that increase the risk of death in the study provinces in order to reduce the mortality rate among pedestrians due to traffic accidents. Therefore, to reduce the pedestrian mortality rate, especially in high-risk provinces, some studies need to be conducted to determine the risk factors in pedestrian mortality.

Keywords: Spatial analysis; pedestrians; road accidents; Iran

Maryam Dadar, Youcef Shahali, Yadolah Fakhri,

A primary investigation of the relation between the incidence of brucellosis and climatic factors in Iran,

Microbial Pathogenesis,

Volume 139,

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103858,

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https://doi.org/10.1016/j.micpath.2019.103858.

(https://www.sciencedirect.com/science/article/pii/S0882401019315153)

Abstract: Brucella spp. are Gram-negative coccobacilli that may grow in different media and environmental conditions for extended periods of time. The survivals of these bacteria in the environment have an important impact on the epidemiology of brucellosis worldwide. The effect of climate on the incidence of certain zoonotic infectious diseases, (recently referred to as climate-sensitive zoonosis) is now well established. The aim of this study was to evaluate the relation between the incidence of brucellosis and climatic parameters in Iran, an important

endemic region for brucellosis with diverse climate. The information on the incidence of human brucellosis in different Iranian provinces for 2016 has been provided by the Ministry of Health and Medical Education, Iran. Annual meteorological data collected between 2015 and 2016 were obtained from the Iranian Meteorological organization (IMO). A regression analysis of the incidence of brucellosis was performed via STATA 14.0 and the heterogeneity among observations was determined via Cochrane's Q-test and I2 statistic. If I2 index was higher than 50%, heterogeneity was considered as considerable. The results of regression analyses revealed a negative significant association between mean ambient air temperature and brucellosis incidence (C = - 0.022, P value = 0.004). Likewise, a positive significant association was found between number of frosty days and brucellosis incidence (C = 0.002, p value = 0.003). Other metrological parameters showed no significant effect on the human brucellosis incidence. Although our results suggest a high degree of temperature sensitivity in regards to the brucellosis incidence in Iran, this study opens up prospects for further investigations regarding environmental conditions and climatic changes influencing the spatial distributions and seasonal/annual cycle of this zoonotic pathogen worldwide.

Keywords: Human brucellosis; Meteorological parameters; Air temperature; Frosty days; Climate

Angelica E. Lang, Jacquelyn M. Maciukiewicz, Meghan E. Vidt, Sylvain G. Grenier, Clark R. Dickerson,

Workstation configuration and container type influence upper limb posture in grocery bagging,

Applied Ergonomics,

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(https://www.sciencedirect.com/science/article/pii/S0003687018302023)

Abstract: Introduction

Repetitive movements and awkward postures are two persistent injury risk factors for grocery store cashiers. Due to the recent rise in popularity of environmentally-friendly grocery bagging options, current recommendations for cashiers are likely outdated. Correspondingly, the objective of this study was to examine the effects of cashier-specific work demands, workstation configuration, and container type on upper limb postures during typical job activities.

Methods

Fifteen experienced cashiers bagged groceries at varying combinations of workstation height (low, medium, high) and container type (reusable bins, reusable bags, plastic bags). Upper limb movement was quantified with motion capture and amplitude probability distribution functions of humeral elevation and humeral axial internal rotation were used to assess the static (10th percentile), median (50th percentile), and peak (90th percentile) postural demands, which were then interpreted in the context of existing postural guidelines.

Results

High workstation height and reusable bags increased right arm elevation at peak posture by 15.7° compared to the low workstation height and reusable bin combination. However, reusable bins increased internal rotation demands of the right arm by 4.3° compared to other container types. Left arm elevation and internal rotation were consistently lower than right arm angles.

Conclusion

Cashiers are encouraged to adjust the workstation to decrease the arm elevation and internal rotation required by higher workstation heights and tall containers, and to use both arms for scanning and packing, when possible, to reduce undesirable arm postures.

Keywords: Upper limb posture; Cashier; Ergonomics; Shoulder; Kinematics

A. Lago, M. Socha, A. Geiger, D. Cook, N. Silva-del-Río, C. Blanc, R. Quesnell, C. Leonardi, Efficacy of colostrum replacer versus maternal colostrum on immunological status, health, and growth of preweaned dairy calves,

Journal of Dairy Science,
Volume 101, Issue 2,
2018,
Pages 1344-1354,
ISSN 0022-0302,
https://doi.org/10.3168/jds.2017-13032.
(https://www.sciencedirect.com/science/article/pii/S0022030217310652)

Abstract: ABSTRACT

Commercially available colostrum replacers (CR) are commonly used when maternal colostrum (MC) is unavailable, for managerial convenience, to ensure quality consistency at first feeding, or in disease control and eradication programs. The objective of this study was to determine the efficacy of feeding First Day Formula (Accelerated Genetics, Baraboo, WI) CR versus pooled MC on immunological status, growth, and health of preweaned dairy calves. A total of 1,220 Jersey and Jersey × Holstein calves born on a California Central Valley dairy farm were assigned after birth to receive either CR or MC following a systematic allocation procedure. Calves assigned to MC were tube fed 2.8 L of MC, and calves assigned to CR were tube fed a total of

500 g of CR (150 g of immunoglobulin G; IgG) mixed into 1.9 L of water at 1 h ± 5 min after the calf was born. A subset of calves was selected for passive transfer (n = 592) and growth (n = 268) analyses. Although both coliform count and total bacteria count were low for MC and CR fed to calves during the study, the predicted probability of calves receiving contaminated liquid feed (coliform count >10,000 cfu/mL) at first feeding was reduced for calves fed CR (1.5%) compared with calves fed MC (6.1%). The mean blood concentration of IgG was lower for calves fed CR than for calves fed MC (19.6 vs. 23.4 mg/mL). However, the apparent efficiency of absorption of IgG did not differ between treatments (34.4 and 35.9% for CR and MC, respectively). Total proteins were lower in calves fed CR compared with MC at 24 h (5.16 vs. 5.84 g/dL, respectively). Calves fed CR were 1.5 kg lighter at weaning and gained 0.03 kg less per day (0.30 vs. 0.33 kg/d, respectively) than calves fed MC before weaning. Height at weaning did not differ between the 2 treatment groups. Calves fed CR tended to have a higher predicted probability of not being treated for diarrhea than calves fed MC (0.142 vs. 0.110, respectively). However, when the disease was present, CR had a higher number of treatment days compared with MC (11.6 vs. 10.8 d, respectively). The hazard ratio of dying did not differ between MC and CR; however, CR calves had a numerically higher risk (hazard ratio = 1.347) of dying compared with calves that received MC. In conclusion, IgG absorption and serum concentration of calves were adequate when calves were fed either CR or MC. The CR-fed calves had a lower probability of receiving contaminated liquid feed and performed similar in terms of health compared with calves receiving high-quality MC, although they were slightly lighter at weaning. Therefore, the CR evaluated in this study is a valid alternative to high-quality (>50 mg of IgG/mL) MC.

Keywords: calf; colostrum; colostrum replacer; passive transfer

Maha A.H. Ghanem, Tarek A. Moustafa, Haidy M. Megahed, Naglaa Salama, Sara A. Ghitani,

A descriptive study of accidental skeletal injuries and non-accidental skeletal injuries of child maltreatment,

Journal of Forensic and Legal Medicine,

Volume 54,

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https://doi.org/10.1016/j.jflm.2017.12.006.

(https://www.sciencedirect.com/science/article/pii/S1752928X17301919)

Abstract: Background

Lack of awareness and recognition of child maltreatment is the major reason behind underreporting. All victims often interact with the health care system for routine or emergency care. In several research works, non-accidental fractures are the second most common injury in maltreated children and it is represented up to one-third of cases.

Aim of the study

To determine the incidence of different types of accidental and non-accidental skeletal injuries among children, estimate the severity of injuries according to the modified injury severity score and to determine the degree of fractures either closed or opened (Gustiloe-Anderson open fracture classification). Moreover, identifying fractures resulting from child abuse and neglect. This aimed for early recognition of non-accidental nature of fractures in child maltreatment that can prevent further morbidity and mortality.

Patients and method

A descriptive study was carried out on all children (109) with skeletal injuries who were admitted to both Main Alexandria and El-Hadara Orthopedic and Traumatology University Hospitals

during six months. History, physical examination and investigations were done for the patients. A detailed questionnaire was taken to diagnose child abuse and neglect. Gustiloe-Anderson open fracture classification was used to estimate the degree of open fractures.

Results

Out of 109 children, twelve cases (11%) were categorized as child maltreatment. One case was physical abuse, eight cases (7.3%) were child neglect and three cases (2.8%) were labour exploitation. Road traffic accidents (RTA) was the commonest cause of skeletal injuries followed by falling from height. Regarding falls, they included 4 cases of stair falls in neglected children and another four cases of falling from height (balcony/window). The remaining 36 cases of falls were accidental. The skeletal injuries were in the form of fractures in 99 cases, dislocation in two cases, both fracture and/or dislocation in three cases, and bone deformity from brachial plexus injury in five cases. Fractures of the lower limb (42.2%) and both bones of the forearm (35%) represented the highest incidence of skeletal injuries in children. 54.5% of fractures due to neglect were lower limb fractures due to falling from height. Ninety-nine cases were diagnosed as long bone fractures and classified as the following; eighty patients as closed fractures, six patients as open grade I fractures, three patients as open grade II fractures, three patients as open grade IIIA fractures, four patients as open grade IIIB fractures and three patients as open grade IIIC fractures.

Conclusion and recommendation

Cases of neglect and child abuse represented 11% of all the studied cases, where neglect was the main cause. RTA and falling from height represented the most common cause of skeletal injury in children. Most fractures due to neglect were lower limb fractures resulting from falling from height. This demonstrates the need for early detection of neglect and child maltreatment aiming for early initiation of parental educational programs about child care and safety. Misinterpretation

of skeletal injuries due to neglect or abuse can be avoided by proper training of orthopedic and traumatology staff on signs of child neglect and abuse.

Keywords: Child abuse; Fractures; Neglect; Maltreatment

Yongtao Yao, Tony G. Geara, Weisong Shi,

Impact of COVID-19 on city-scale transportation and safety: An early experience from Detroit,

Smart Health,

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(https://www.sciencedirect.com/science/article/pii/S2352648321000404)

Abstract: The COVID-19 pandemic brought unprecedented levels of disruption to the local and regional transportation networks throughout the United States, especially the Motor City---Detroit. That was mainly a result of swift restrictive measures such as statewide quarantine and lock-down orders to confine the spread of the virus and the rising number of COVID-19 confirmed cases and deaths. This work is driven by analyzing five types of real-world data sets from Detroit related to traffic volume, daily cases, weather, social distancing index, and crashes from January 2019 to June 2020. The primary goals of this work are: i) figuring out the impacts of COVID-19 on the transportation network usage (traffic volume) and safety (crashes) for the City of Detroit, ii) determining whether each type of data (e.g. traffic volume data) could be a useful factor in the confirmed-cases prediction, and iii) providing an early future prediction method for COVID-19 rates, which can be a vital contributor to life-saving advanced

preventative and preparatory responses. In addressing these problems, the prediction results of six feature groups are presented and analyzed to quantify the prediction effectiveness of each type of data. Then, a deep learning model was developed using long short-term memory networks to predict the number of confirmed cases within the next week. The model demonstrated a promising prediction result with a coefficient of determination (R2) of up to approximately 0.91. Furthermore, six essential observations with supporting evidence are presented, which will be helpful for decision-makers to take specific measures that aid in preventing the spread of COVID-19 and protecting public health and safety. The proposed approaches could be applied, customized, adjusted, and replicated for analysis of the impact of COVID-19 on a transportation network and prediction of the anticipated COVID-19 cases using a similar data set obtained for other large cities in the USA or from around the world.

Keywords: COVID-19; Data analysis; Prediction; Quarantine; Transportation networks; Traffic volume crashes; Social distancing weather; Daily cases Detroit

Chu-Chih Chen, Yin-Ru Wang, Yu-Chun Wang, Shiou-Li Lin, Cheng-Ta Chen, Mong-Ming Lu, Yue-Liang L. Guo,

Projection of future temperature extremes, related mortality, and adaptation due to climate and population changes in Taiwan,

Science of The Total Environment,

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(https://www.sciencedirect.com/science/article/pii/S0048969720369047)

Abstract: Background

Extreme temperature events have been observed to appear more frequently and with greater intensity in Taiwan in recent decades due to climate change, following the global trend. Projections of temperature extremes across different climate zones and their impacts on related mortality and adaptation have not been well studied.

Methods

We projected site-specific future temperature extremes by statistical downscaling of 8 global climate models followed by Bayesian model averaging from 2021 to 2060 across Taiwan under the representative concentration pathway (RCP) scenarios RCP2.6, RCP4.5, and RCP8.5. We then calculated the attributable mortality (AM) in 6 municipalities and in the eastern area by multiplying the city/county- and degree-specific relative risk of mortality according to the future population projections. We estimated the degree of adaptation to heat by slope reduction of the projected AM to be comparable with that in 2018.

Results

The annual number of hot days with mean temperatures over 30 °C was predicted to have a substantial 2- to 5-fold increase throughout the residential areas of Taiwan by the end of 2060 under RCP8.5, whereas the decrease in cold days was less substantial. The decrease in cold-related mortality below 15 °C was projected to outweigh heat-related mortality for the next two decades, and then heat-related mortality was predicted to drastically increase and cross over cold-related mortality, surpassing it from 2045 to 2055. Adjusting for future population size, the percentage increase in heat-related deaths per 100,000 people could increase by more than 10-fold under the worst scenario (RCP8.5), especially for those over 65 years old. The heat-related

impacts will be most severe in southern Taiwan, which has a tropical climate. There is a very high demand for heat-adaptation prior to 2050 under all RCP scenarios.

Conclusions

Spatiotemporal variations in AM in cities in different climate zones are projected in Taiwan and are expected to have a net negative effect in the near future before shifting to a net positive effect from 2045 to 2055. However, there is an overall positive and increasing trend of net effect for elderly individuals under all the emission scenarios. Active adaptation plans need to be well developed to face future challenges due to climate change, especially for the elderly population in central and southern Taiwan.

Keywords: Bayesian model average; Climate zone; Crossover; Representative concentration pathway; Statistical downscaling

Mizue Matsuo, Keiji Muramatsu, Shinya Matsuda, Kiyohide Fushimi, Yasuo Kaizuka, Masayuki Kamochi,

Age-dependent influence of premorbid underweight status on mortality in severe burn patients: An administrative database study,

Burns,

Volume 47, Issue 6,

2021,

Pages 1314-1321,

ISSN 0305-4179,

https://doi.org/10.1016/j.burns.2020.12.004.

(https://www.sciencedirect.com/science/article/pii/S0305417920306240)

Abstract: Purpose

To examine the associations between premorbid nutritional status and in-hospital mortality in severe burn patients according to age in Japan.

Methods

We retrospectively extracted the data of 14,345 patients aged 18–84 years admitted for burns from April 1, 2014, to March 31, 2018, using the Japanese Diagnosis Procedure Combination database. The exclusion criteria were out-of-hospital cardiac arrest, death in the emergency room, readmission, and planned admission. We collected data on age, sex, height, weight, comorbidities, burn index, and mechanical ventilation use and performed age-stratified multilevel logistic regression analyses to estimate associations between premorbid body mass index (BMI) and in-hospital mortality.

Results

We analyzed 2968 patients with a burn index ≥10, including 831 elderly aged 75–84 years. In patients aged 18–74 years, being underweight (BMI < 18.5) significantly decreased mortality (0.34 [0.15–0.77]; P = 0.010). In contrast, in patients aged 75–84 years, being underweight significantly increased mortality (2.11 [1.05–4.25]; P = 0.036). Being overweight (BMI >25) increased mortality in both age groups, but not significantly.

Conclusions

The results suggest that pre-morbidly underweight elderly patients aged 75–84 years with severe burns have high mortality risks. Further research is needed to identify optimal care strategies for this population.

Keywords: Burns; Premorbid status; Underweight; Mortality

Bing Wang, Dinglin Li, Chao Wu,

Characteristics of hazardous chemical accidents during hot season in China from 1989 to 2019: A statistical investigation,

Safety Science,

Volume 129,

2020,

104788,

ISSN 0925-7535,

https://doi.org/10.1016/j.ssci.2020.104788.

(https://www.sciencedirect.com/science/article/pii/S0925753520301855)

Abstract: Because high temperature is one of the main causes of hazardous chemical accidents, these accidents frequently occur in China during hot season (from June to September). Understanding the historical accidents is important for accident prevention and risk mitigation. However, presently, no statistical analysis on the characteristics of China's hazardous chemical accidents that occurred during hot season is available. Thus, by utilising data from official sources, a statistical investigation on 76 serious hazardous chemical accidents that occurred during hot season in China (1989–2019) was performed in terms of seven aspects: region where the accident occurred, type of accident, types of hazardous chemicals, links of occurrence, size of enterprises, direct cause, and period when the accident occurred. Moreover, according to the statistical results, this paper proposes some potential countermeasures and suggestions to prevent hazardous chemical accidents during hot season in China. This study can provide useful information for preventing hazardous chemical accidents and strengthening preventive measures in chemical plants during hot season in China and in other countries.

Keywords: Hazardous chemical accidents; Statistical investigation; Hot season; China

Paolo Dell'Oglio, Mohamed Bishr, Katharina Boehm, Vincent Trudeau, Alessandro Larcher, Zhe Tian, Josè Sosa, Marco Moschini, Fred Saad, Umberto Capitanio, Alberto Briganti, Markus Graefen, Francesco Montorsi, Pierre I. Karakiewicz,

Survival Outcomes in Octogenarian and Nonagenarian Patients Treated with First-line Androgen Deprivation Therapy for Organ-confined Prostate Cancer,

European Urology Focus,

Volume 4, Issue 6,

2018,

Pages 834-841,

ISSN 2405-4569,

https://doi.org/10.1016/j.euf.2017.01.017.

(https://www.sciencedirect.com/science/article/pii/S2405456917300263)

Abstract: Background

The use of primary androgen deprivation therapy (PADT) is common in elderly men with early-stage prostate cancer (PCa), despite the absence of guideline recommendations.

Objective

To examine survival patterns of octo- and nonagenarian men with organ-confined PCa exposed to PADT, to assess whether their life expectancy warrants androgen deprivation therapy use.

Design, setting, and participants

In the Surveillance, Epidemiology, and End Results-Medicare-linked database, we identified 14 785 octo- and nonagenarian organ-confined PCa patients treated with PADT between 1991 and 2009.

Outcome measurements and statistical analysis

The smoothed cumulative incidence method was used to examine 10-yr overall mortality, cancer-specific mortality (CSM), and other-cause mortality (OCM) rates. Multivariable Cox regression analyses focused on the combined effect of age and Charlson comorbidity index (CCI) after adjusting for different confounders.

Results and limitations

Of all the deaths observed during the study period, 80% were due to non-cancer causes and 20% were due to PCa. The 10-yr overall survival (OS) rate in the overall population was 15.4%. The 10-yr OS rates ranged from 19.9% in patients aged 80–84 yr to 3.1% in those aged ≥90 yr. Similarly, the 10-yr OS rates ranged from 18.7% in patients with CCI=0 to 11.5% in those with CCI≥2. The 10-yr OCM rate in the overall population was 68.2%. The 10-yr OCM rates ranged from 64.6% in patients aged 80–84 yr to 77.2% in patients aged ≥90 yr. Similarly, the 10-yr OCM rates ranged from 62.1% in patients with CCI=0 to 75.2% in those with CCI≥2. The 10-yr CSM rate in the overall population was 16.4%. The 10-yr CSM rates ranged from 15.5% in patients aged 80–84 yr to 19.7% in those aged ≥90 yr, and from 19.2% in patients with CCI=0 to 13.3% in those with CCI≥2.

Conclusions

Of the elderly patients with organ-confined PCa exposed to PADT, only 15% survive at 10-yr follow-up. Mortality related to non-cancer causes is the leading cause of death in the same follow-up period. These figures question the rationale for PADT in elderly men with organ-confined PCa.

Patient summary

In this study, we looked at the survival patterns of octo- and nonagenarians treated with primary androgen deprivation therapy for organ-confined prostate cancer. We found that a small

proportion of patients who received primary androgen deprivation therapy remain alive at 10-yr follow-up, and the leading cause of death was not attributable to prostate cancer.

Keywords: Elderly patients; Localized prostate cancer; Survival patterns; Overtreatment; Primary androgen deprivation therapy

W. Boulefaa, T. Autret, T.H. Benchekroun,

Mobiliser les arbitrages organisationnels pour prévenir les risques professionnels dans les espaces confinés : le cas des chantiers de réfection de canalisation en égouts,

Psychologie du Travail et des Organisations,

Volume 26, Issue 1,

2020,

Pages 19-44,

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https://doi.org/10.1016/j.pto.2020.01.010.

(https://www.sciencedirect.com/science/article/pii/S1420253020300121)

Abstract: Résumé

Cette contribution participe à alimenter les apports de l’ergonomie à la prévention des risques professionnels dans les espaces confinés, spécifiquement dans les chantiers de réfection de canalisations en égouts. L’intervention déployée s’est structurée autour d’une démarche participative et collaborative mobilisant l’ensemble des parties prenantes du projet d’amélioration durable de la prévention des risques d’accidents de travail et des troubles musculosquelettiques chez les ouvriers. Des analyses fines des activités des ouvriers couplées à une analyse systémique de la conception et du suivi collectif des chantiers ont été réalisées. Cela a permis de caractériser les risques d’atteintes à la santé-sécurité des équipes de chantiers comme les produits de

compromis entre plusieurs exigences organisationnelles et contraintes situationnelles. Élargie au chef de chantier, l'analyse de son activité, pourtant stratégique, d'anticipation et de conception continue des situations d'intervention, s'est avérée bridée par une organisation verticale des chantiers qui intègre peu son expertise. À partir du diagnostic, validé et partagé par tous, les enjeux de prévention se sont articulés aux objectifs de performance des chantiers dans une perspective de co-conception avec et par les différents niveaux hiérarchiques du département. L'intervention a rendu possible la construction collaborative de nouvelles règles organisationnelles en capacité de prendre en compte les réalités concrètes du travail des ouvriers et des chefs de chantier.

This contribution participates to the development of ergonomic contributions to the prevention of occupational risks in confined spaces, specifically in sewer pipe rehabilitation projects. The intervention deployed was structured around a participatory and collaborative approach involving all stakeholders in the project to sustainably improve the prevention of work-related accidents and musculoskeletal disorders among workers. Detailed analyses of workers' activities coupled with a systemic analysis of the design and collective monitoring of the worksites were carried out. This made it possible to characterize the health and safety risks of site teams as products that compromise between several organizational requirements and situational constraints. Extended to the site manager, the analysis of his activity, although strategic, of anticipation and continuous design of intervention situations, proved to be limited by a vertical organization of the sites, which does not integrate his expertise. Based on the diagnosis, validated and shared by all, the prevention challenges were articulated with the performance objectives of the worksites in a perspective of co-design with and by the different hierarchical levels of the department. The intervention made it possible to collaboratively build new organizational rules that consider the concrete realities of the work of workers and site managers.

Keywords: Dilemme opératoire; Conception; Chantiers; Arbitrages; Prévention; Operative dilemma; Design; Building site; Arbitration; Prevention

Annamaria Otto, Kim Emery, Julie N. Côté,
Differences in muscular and perceptual responses to a neck/shoulder fatiguing task between women and men,
Journal of Electromyography and Kinesiology,
Volume 43,
2018,
Pages 140-147,
ISSN 1050-6411,
https://doi.org/10.1016/j.jelekin.2018.09.010.
(https://www.sciencedirect.com/science/article/pii/S1050641118301925)
Abstract: Fatigue is a risk factor for the development of work-related musculoskeletal disorders (WMSDs) of the neck/shoulder, and exertion is a state that connects the sensory/affective and physical aspects of fatigue. Relationships between ratings of perceived exertion (RPE) and electromyogram (EMG) signal characteristics have been identified. However, the sex-specific effects on these relationships are unclear and could be affected by personal factors such as skinfold thickness. 28 healthy young adults completed a fatiguing task with the arm held at shoulder height. Neck/shoulder EMG and RPE were collected at the end of each minute. Males showed stronger correlations between RPE with anterior deltoid (AD, rs = 0.37) and upper trapezius (UT, rs = 0.48) EMG, whereas females showed a weak relationship between RPE and UT EMG (rs = 0.22), and no relationship with AD EMG. Significant correlations were observed between biceps EMG and skinfold thickness in both males and females. Findings suggest that

neck/shoulder perceived exertion is strongly associated to the activity of shoulder mobilizers (anterior deltoid) in men, whereas in women, it is rather associated to the activity of shoulder stabilizers (upper trapezius), and to a lesser extent. It is possible that in turn, these sex differences affect fatigue adaptation strategies. Skinfold thickness may be an important variable to consider when studying sex-specific characteristics of muscle fatigue.

Keywords: Sex; Repetitive work; Fatigue; Neck/shoulder; Perceived exertion; Electromyography

Michael A. Pentella,

The Canary in the Coal Mine: Clinical and Public Health Laboratories Respond to Biosafety Risks,

Clinical Microbiology Newsletter,

Volume 40, Issue 9,

2018,

Pages 69-74,

ISSN 0196-4399,

https://doi.org/10.1016/j.clinmicnews.2018.04.003.

(https://www.sciencedirect.com/science/article/pii/S0196439918300400)

Abstract: Biosafety is important to all laboratories, as any clinical specimen has the potential to harbor an infectious agent. The rate at which infectious diseases have spread globally in recent years has only heighted awareness of laboratory safety and the assessment of biosafety risk. This article presents an overview of responses to recent events and provides resources for laboratories that can be utilized to prepare and improve their biosafety programs.

Zhirong Wang, Shichen Chen, Xinrui He, Chao Wang, Dan Zhao,

A multi-factor evaluation method for the thermal runaway risk of lithium-ion batteries,

Journal of Energy Storage,

Volume 45,

2022,

103767,

ISSN 2352-152X,

https://doi.org/10.1016/j.est.2021.103767.

(https://www.sciencedirect.com/science/article/pii/S2352152X21014407)

Abstract: To systematically and quantitatively establish a multi-factor evaluation method for the thermal runaway risk of lithium-ion batteries (LIBs), the fuzzy analytic hierarchy process was adopted in this paper. The own hazardous factor of battery, hazardous factor of vented gases, jet fire and high-temperature mixture (JFHM), ejected powder and their corresponding sub-factors were evaluated and analyzed. Combined with literature, the model of multi-factor evaluation method was established and the index system was determined. The pair-wise comparison matrixes for the thermal runaway risk were drawn, the triangular fuzzy method was used to calculate and the evaluation weight was obtained. The factors' ranges of the criteria risk grades were quantitatively determined. The risk of thermal runaway consequences under the selected abuse condition was analyzed with a case study. The result shows that the thermal runaway risk from LIBs under the selected abuse condition is level III: the LIB is more dangerous after thermal runaway. Meanwhile, in this method, the lower explosion limit of gas and the maximum height/ length of the JFHM are the two factors with the greatest weights. In the actual design and use process, people should pay attention to the protection of the runaway gas explosion and the harm of JFHM.

Keywords: Lithium-ion battery; Thermal runaway; Risk assessment; Fuzzy analytic hierarchy process

Samuel T. Olatunbosun, Jay S. Kaufman, Andrew F. Bella,
Central Obesity in Africans: Anthropometric Assessment of Abdominal Adiposity and its Predictors in Urban Nigerians,
Journal of the National Medical Association,
Volume 110, Issue 5,
2018,
Pages 519-527,
ISSN 0027-9684,
https://doi.org/10.1016/j.jnma.2018.01.001.
(https://www.sciencedirect.com/science/article/pii/S0027968417301566)

Abstract: Objective

To assess the occurrence of central obesity and identify its predictors in urban Africans using anthropometric tools. Another objective was to evaluate the anthropometric indices and their interaction with various cardiovascular risk factors.

Methods

In an obesity survey in a major Nigerian city, we measured the prevalence of central obesity in 998 randomly selected men and women using the IDF (International Diabetes Federation) criteria. Normalized values of three anthropometric indices, waist circumference (WC), WHR (waist-to-hip ratio) and WHtR (waist-to-height ratio) were also employed in assessing central adiposity and its predictors in the population.

Results

Most (61%) female participants had central obesity compared with 9% of the males based on the IDF waist criteria. Higher income level and physical inactivity were associated with central obesity ($p < 0.001$). In multivariate analyses, older participants and women were more likely to have central obesity ($p < 0.001$), but men had higher WHR than women at the same body mass index. WC was a stronger predictor of glucose intolerance than WHR, whereas WHR was more predictive of hypertension than WC. WHR showed a strong relationship with hypertension but not with glucose intolerance. WHtR was predictive of plasma glucose and diastolic blood pressure. WC showed strongest correlation with other indices.

Conclusions

Central obesity was highly prevalent among women in this sample. It was associated with age, gender, socioeconomic status, physical inactivity, and it predicted glucose intolerance and hypertension. WC was a major determinant of both cardiovascular risk factors. It showed best correlation with other anthropometric indices.

Keywords: Central obesity; Abdominal adiposity; Anthropometric indices; Epidemiology; Africans

Antonio Sánchez-Squella, Daniel Fernández, Rodrigo Benavides, Javier Saldias,
Risk analysis, regulation proposal and technical guide for pilot tests of hydrogen vehicles in underground mining,
International Journal of Hydrogen Energy,
Volume 47, Issue 43,
2022,
Pages 18799-18809,
ISSN 0360-3199,

https://doi.org/10.1016/j.ijhydene.2022.03.080.
(https://www.sciencedirect.com/science/article/pii/S0360319922011181)

Abstract: Safety related issues, regarding the use of hydrogen technologies have raised great concern in the industry, especially in mining, due to confined places where hydrogen leaks can accumulate and eventually cause a fire hazard or explosion. Currently, there are no sufficiently robust regulations or experiences regarding the use of hydrogen in mining, which must be resolved to design safety models, pertinent regulations and a strategy to guide the use of hydrogen. This article qualitatively and quantitatively analyzes the risks of a HFCV pilot project, identifying these risks to determine how they are involved in mining operations and evaluates how dangerous these are in this environment. This is achieved through a HAZOP study and using the F&EI, where the results contribute to the knowledge of hydrogen technologies. One of the strongest results obtained by using the F&EI, shows that a vehicle fueled by hydrogen (5 kg at 700 bar) in full operation presents an index of 153.0, a vehicle of similar characteristics fueled with natural gas (20 kg at 200 bar) will present a value of 197.1. Therefore, if the use of natural gas is authorized in underground mining, hydrogen that can be an even safer alternative, should be authorized too. Moreover, the results show that there is a similar probability with diesel (60 kg at 1 bar) of causing a potential incident, in addition, the HAZOP indicates that as long as hydrogen leaks are kept under control with adequate ventilation and appropriate vehicle design, the system becomes even more robust, which would be achieved by including additional infrastructure security measures to mitigate events of fire and explosion.

Keywords: Hydrogen; Mining; Electromobility; Fuel cell; Safety; Fire; Explosion

Peter S. Spencer, Valerie S. Palmer, Glen E. Kisby,

Western Pacific ALS-PDC: Evidence implicating cycad genotoxins,

Journal of the Neurological Sciences,

Volume 419,

2020,

117185,

ISSN 0022-510X,

https://doi.org/10.1016/j.jns.2020.117185.

(https://www.sciencedirect.com/science/article/pii/S0022510X20305219)

Abstract: Amyotrophic Lateral Sclerosis and Parkinsonism-Dementia Complex (ALS-PDC) is a disappearing neurodegenerative disorder of apparent environmental origin formerly hyperendemic among Chamorros of Guam-USA, Japanese residents of the Kii Peninsula, Honshu Island, Japan and Auyu-Jakai linguistic groups of Papua-Indonesia on the island of New Guinea. The most plausible etiology is exposure to genotoxins in seed of neurotoxic cycad plants formerly used for food and/or medicine. Primary suspicion falls on methylazoxymethanol (MAM), the aglycone of cycasin and on the non-protein amino acid β-N-methylamino-L-alanine, both of which are metabolized to formaldehyde. Human and animal studies suggest: (a) exposures occurred early in life and sometimes during late fetal brain development, (b) clinical expression of neurodegenerative disease appeared years or decades later, and (c) pathological changes in various tissues indicate the disease was not confined to the CNS. Experimental evidence points to toxic molecular mechanisms involving DNA damage, epigenetic changes, transcriptional mutagenesis, neuronal cell-cycle reactivation and perturbation of the ubiquitin-proteasome system that led to polyproteinopathy and culminated in neuronal degeneration. Lessons learned from research on ALS-PDC include: (a) familial disease may reflect common toxic exposures across generations, (b) primary disease prevention follows cessation of exposure to culpable environmental triggers; and (c) disease latency provides a prolonged period during

which to intervene therapeutically. Exposure to genotoxic chemicals (“slow toxins”) in the early stages of life should be considered in the search for the etiology of ALS-PDC-related neurodegenerative disorders, including sporadic forms of ALS, progressive supranuclear palsy and Alzheimer's disease.

Keywords: Cycasin; Methylazoxymethanol; L-BMAA; Sitosterol; DNA damage; Cell cycle; Neurodegeneration

Ta-Chung Chao, Wen-Chi Pan, Yi-Fang Tsai, Yueh-Ching Chou, Yu-Rong Liu, Sheng-Fan Wang, Ying-Jen Chen, Pavel Souček, Yune-Fang Ueng,

Plasma endoxifen and 4-hydroxytamoxifen levels in CYP2D6(C100T) carrying breast cancer patients and association with serum cholesterol,

Toxicology and Applied Pharmacology,

Volume 378,

2019,

114619,

ISSN 0041-008X,

https://doi.org/10.1016/j.taap.2019.114619.

(https://www.sciencedirect.com/science/article/pii/S0041008X19302212)

Abstract: Breast cancer patients with high cholesterol biosynthesis signature had poorer therapeutic outcome. Cytochrome P450 (CYP) 2D6 is crucial in the oxidation of tamoxifen to generate active metabolites, 4-hydroxytamoxifen and endoxifen. CYP2D6 variants with C100T substitution encode null or poor functional proteins. This study aims to examine the association of C100T genotypes and serum lipid levels with plasma drug levels in patients. Plasma tamoxifen concentration was positively associated with serum triglyceride concentration, adjusting for age

and C100T genotype. Overweight (body mass index >24.0) patients with high serum cholesterol (≥200 mg/dL) had increased risks of ineffective endoxifen levels (<5.97 ng/mL). Compared to the low-cholesterol group, the high-cholesterol group had a lower 4-hydroxytamoxifen or endoxifen level in T/T carriers. In T/T carriers, the high-cholesterol group had an increased risk of an ineffective endoxifen level. Metastasis, hot flash/flushing, and high alanine transaminase did not relate to plasma 4-hydroxytamoxifen or endoxifen levels. Results indicate that C100T and high serum cholesterol are risk factors of ineffective endoxifen levels in Taiwanese breast cancer patients. These findings warrant further studies of a large hypercholesterolemic population to examine the outcome of increased doses of tamoxifen.

Keywords: Breast cancer; Tamoxifen; Endoxifen; CYP2D6(C100T); Cholesterol; Metastasis

Khizar Hayat, Muhammad Afzal, Muhammad Anjum Aqueel, Sajjad Ali, Muhammad Farhan Saeed, Ahmad Kaleem Qureshi, Muhammad Irfan Ullah, Qaiser M. Khan, Muhammad Tayyib Naseem, Umair Ashfaq, Christos A. Damalas,

Insecticide toxic effects and blood biochemical alterations in occupationally exposed individuals in Punjab, Pakistan,

Science of The Total Environment,

Volume 655,

2019,

Pages 102-111,

ISSN 0048-9697,

https://doi.org/10.1016/j.scitotenv.2018.11.175.

(https://www.sciencedirect.com/science/article/pii/S0048969718345315)

Abstract: Biomonitoring of people exposed to hazardous materials provides opportunities for early identification of several diseases, particularly in those individuals who are constantly exposed to pesticides, such as pesticide operators and workers in pesticide manufacturing industry. However, data on this hot topic are limited in Pakistan. In this study, insecticide toxic effects and biochemical alterations (i.e., damage in DNA and enzyme activity) were studied in blood samples of occupationally exposed individuals from Punjab, Pakistan. Eight out of twenty-seven blood samples (29.6%) of the pesticide operators were found positive in five insecticides, with the maximum concentration found for chlorpyrifos-methyl (0.039 μg/mL). Eleven out of twenty-seven blood samples (40.7%) of the pesticide industry workers were found positive in eight insecticides, with the maximum concentration found for endosulfan (0.051 μg/mL). Comet tail length was 16.88 ± 4.57 μm in pesticide industry workers and 16.33 ± 3.78 μm in pesticide operators, which were significantly higher ($P < 0.01$) than that recorded in the control group (4.84 ± 2.21 μm). Values of serum cholinesterase (SChE) concentration were slightly lower ($P > 0.05$) in exposed individuals, whereas values of alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) concentration were significantly higher ($P < 0.01$) in exposed individuals compared with control group. Exposure duration and total insecticide concentration in blood samples were positively associated with comet tail length, ALT activity, AST activity, and ALP activity, but negatively with SChE. DNA damage was higher in smokers vs. non-smokers. Also, a positive association was found between comet tail length and number of cigarettes per day. Overall, occupational exposure to insecticides can pose serious health risks to pesticide operators and workers in pesticide manufacturing industry, highlighting the necessity of personal protection in those groups for preventing exposure and resultant health disorders.

Keywords: DNA damage; Enzyme activity; Occupational safety; Pesticide exposure

Di Wang, Changfu Hao, Lin Zhang, Jianhui Zhang, Suna Liu, Yiping Li, Yaqian Qu, Youliang Zhao, Ruoxuan Huang, Jingjing Wei, Wu Yao,
Exosomal miR-125a-5p derived from silica-exposed macrophages induces fibroblast transdifferentiation,
Ecotoxicology and Environmental Safety,
Volume 192,
2020,
110253,
ISSN 0147-6513,
https://doi.org/10.1016/j.ecoenv.2020.110253.
(https://www.sciencedirect.com/science/article/pii/S0147651320300920)
Abstract: Silica particles can cause a systemic disease in workers termed lung silicosis, characterized by diffuse fibrosis. The development of lung silicosis involves various signaling pathway networks comprising numerous cell types and cytokines. As an important medium for communication between cells, exosomes have emerged as a hot research topic; however, the role of exosomal microRNAs (miRNAs) in silicosis remains unclear. In this study, we conducted high-throughput sequencing to generate exosomal miRNAs profiles from macrophages that were either exposed to silica or not. A total of 298 miRNAs were differentially expressed, with 155 up-regulated and 143 down-regulated. Highly conserved differentially expressed miRNAs were functionally annotated and analyzed to predict target genes. Among target interactions associated with the TGF-β signaling pathway, miR-125a-5p and its putative target gene, Smurf1, were subjected to further research. As expected, levels of miR-125a-5p were upregulated in human serous exosomes and vitro, and inhibit the exosomal miR-125a-5p suppressed the expression of

the fibrosis hallmarks. Besides, high levels of the miRNA led to upregulation of smooth muscle actin alpha and repression of Smurf1 in NIH-3T3 and MRC-5 cells. ID1 and SMAD1, downstream of TGF-β signaling, were upregulated, indicating potential activation of this signaling pathway. These results contribute to understanding of the intercellular communication mediated by exosomal miRNAs and its critical role in fibroblast to myofibroblast transition and silicosis.

Keywords: Exosomes; miR-125a-5p; Silica; Macrophages; Fibroblasts; Transdifferentiation

Régis Pouillot, Sofia Santillana Farakos, Jane M. Van Doren,
Modeling the risk of low bone mass and osteoporosis as a function of urinary cadmium in U.S adults aged 50–79 years.,
Environmental Research,
Volume 212, Part B,
2022,
113315,
ISSN 0013-9351,
https://doi.org/10.1016/j.envres.2022.113315.
(https://www.sciencedirect.com/science/article/pii/S0013935122006429)

Abstract: We developed an association model to estimate the risk of femoral neck low bone mass and osteoporosis from exposure to cadmium for women and men aged 50–79 in the U.S, as a function of the urinary cadmium (U–Cd) levels. We analyzed data from the NHANES 2005–2014 surveys and evaluated the relationship between U–Cd and femoral neck bone mineral density (BMD) using univariate and multivariate regression models with a combination of NHANES cycle, gender, age, smoking, race/ethnicity, height, body weight, body mass index,

lean body mass, diabetes, kidney disease, physical activity, menopausal status, hormone replacement therapy, urinary lead, and prednisone intake as confounding variables. The regression coefficient between U–Cd and femoral neck BMD obtained with the best multivariate regression was used to develop an association model that can estimate the additional risk of low bone mass or osteoporosis in the population given a certain level of U–Cd. Results showed a linear relationship between U–Cd and BMD, conditional to body weight, where individuals with higher U–Cd had decreased BMD values. Our results do not support the hypothesis of a threshold for the effect of Cd on bone. Our model estimates that exposure to Cd results in an increase of 0.51 percentage points (CI95% 0.00, 0.92) of the population diagnosed with osteoporosis, compared to a theoretical absence of exposure. We estimate that 16% (CI95%: 0.00, 40%) of osteoporosis cases in the U.S. 50–79 aged population are a result of Cd exposure. This study presents the first continuous model estimating low bone mass and osteoporosis risk in the U.S. population given actual or potential changes in U–Cd levels. Our model will provide information to inform FDA's Closer to Zero initiative goal to reduce exposure to toxic elements.

Keywords: Cadmium; Risk; Bone; Prevalence; Exposure; Model

Bruno Perazzo Pedroso Barbosa, Nisio de Carvalho Lobo Brum,
Validation and assessment of the CFD-0 module of CONTAM software for airborne contaminant transport simulation in laboratory and hospital applications,
Building and Environment,
Volume 142,
2018,
Pages 139-152,
ISSN 0360-1323,

https://doi.org/10.1016/j.buildenv.2018.06.013.
(https://www.sciencedirect.com/science/article/pii/S0360132318303561)

Abstract: Hospital and laboratory buildings are designed with intrinsic features for infection control, and are related to an intensive energy use. Although many studies suggest that insufficient ventilation increases the risk of disease transmission in the indoor environment, significant questions still remain on the ventilation requirements for airborne infection control. ASHRAE proposes high research priority on the study of indoor flow regimes, room pressurization and filtration, for hospitals and laboratories where infectious diseases agents are handled. The objective of this paper is to promote an assessment and validation of the CFD-0 module of the CONTAM software, for the simulation of airborne contaminant transport in hospital and laboratory applications. These objectives are justified by the fact that this public domain code, supported by the NIST, may be an important tool for studying the role of ventilation parameters in infection control for hospital and laboratory settings. Three benchmarks were selected for that task: the ASHRAE-RP 1271, geared to challenge the code ability in simulating the complex indoor airflow features, such as jets, separation, impingement, and thermal plumes, that arise in room transitional non-isothermal confined flow; A benchmark that resembles real laboratory spaces; and a third benchmark, that resembles real hospital isolation rooms. Results demonstrated that CFD-0 provided, at least, a marginally acceptable performance, for mixed and displacement ventilation modes. The prediction results are more meaningful than those using the “perfect mixture” assumption, for assessments on ventilation performance and personnel exposure to hazardous substances in these spaces.

Keywords: Infection control; Hospital; Laboratory; CFD; Ventilation

Emilio Palazzi, Fabio Currò, Bruno Fabiano,

Low rate releases of hazardous light gases under semi-confined geometry: A consequence based approach and case-study application,

Journal of Loss Prevention in the Process Industries,

Volume 63,

2020,

104038,

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https://doi.org/10.1016/j.jlp.2019.104038.

(https://www.sciencedirect.com/science/article/pii/S0950423018307241)

Abstract: As evidenced by accident statistics, an important factor when considering the safe operation of process plants is the effective mitigation of the effects of gaseous flammable releases, either by a prevention, or a protection approach. A detailed historical analysis was performed considering accidental scenarios associated with the use and management of light gases, starting from raw data selected from FACTS database and analysed by a causal multi-layer method. Results revealed that the major part of the accidental releases involving methane, hydrogen, ethene, ammonia can be attributed to organizational or process/plant immediate causes. As expected, the most frequent scenarios following the release are fire and explosion. We focus our attention on the development of a short-cut method allowing preliminary evaluation of the maximum gaseous build-up under semi-confined conditions, limiting the effects of the fire/explosion scenario to a tolerable level. The limitations of the model that is applied to selected case-studies and require further experimental validation are critically discussed. The results of the application of the model, which can boast of being safe but not disproportionately conservative, can be set as a maximum threshold in proper designing technical measures aiming at limiting the

effects to a tolerable level by protection methods, e.g. isolation, venting, suppression and containment.

Keywords: Accident statistics; Explosion; Flammable release; Flash-fire; Short-cut model

Guoqi Yu, Rencong Yang, Dongmei Yu, Jiansheng Cai, Jiexia Tang, Wenwen Zhai, Yi Wei, Shiyi Chen, Quanhui Chen, Ge Zhong, Jian Qin,

Impact of meteorological factors on mumps and potential effect modifiers: An analysis of 10 cities in Guangxi, Southern China,

Environmental Research,

Volume 166,

2018,

Pages 577-587,

ISSN 0013-9351,

https://doi.org/10.1016/j.envres.2018.06.047.

(https://www.sciencedirect.com/science/article/pii/S0013935118303529)

Abstract: Background

In the current context of global climate change, understanding the impact of climate on respiratory infectious diseases such as mumps and the potential modified factors is crucial, especially in developing countries. However, research on the climate-related incidence of mumps is rare, inconsistent and mainly limited to a single city or region.

Methods

Daily mumps cases and meteorological variables of 10 cities in Guangxi, Southern China were collected for 2005–2017. Two-stage analyses were performed to assess the relationship between meteorological factors and mumps incidence during two time-periods: 2005–2012 and 2013–

2017, separately. First, a Poisson regression model that allows over-dispersion was used to estimate the city-specific climate-related morbidity after controlling for temporal trends, day of week, and national statutory holidays. Then, we used a multivariate meta-analytical model to pool the city-specific effect estimates and conducted subgroup analyses. Multivariate meta-regression was applied to detect potential effect modifiers.

Results

Non-linear relationships were observed among mean temperature, wind speed, and mumps incidence in 2005–2012. The impact of high temperature on mumps incidence was short and rapid, whereas the impact of low temperature was long and slow. The total cumulative relative risk (RR) associated with hot temperature was 1.18 [95% Confidence Interval (CI): 0.93, 1.48], which was calculated by comparing the incidence of mumps above the 90th percentile of temperature with its incidence at the median temperature at lag of 0–30 days. Meanwhile, the RR associated with cold temperature was calculated to be 1.50 (95% CI: 1.08, 2.10) by comparing the incidence of mumps below the 10th percentile of temperature with its incidence at the median temperature. Similarly, the RRs associated with windless and windy conditions for the total population were 1.23 (95% CI: 1.04, 1.46) and 0.83 (95% CI: 0.67, 1.02), respectively. Effects based on extreme temperature and wind speed conditions were more prominent in males than in females. Compared with children and adults, adolescents (5–14 years old) were more sensitive to extreme weather conditions. Geographical latitude, Population density, GDP per capita, Number of health institutions, Highly educated population and Inoculation rate were considered the most likely associated modifiers. In addition, the correlation between meteorological factors and the incidence of mumps and modification of socioeconomic factors after 2013 showed similar curves compared with results in 2005–2012, but the cumulative effect was not statistically significant.

Conclusions

Meteorological factors, such as temperature and wind speed, exert a significant impact on the incidence of mumps. The relationship varies depending on gender and age. Socioeconomic factors such as vaccination, GDP, geographical latitude, etc. may substantially affect the weather-related mumps incidence.

Keywords: Meteorological factor; Modifier; Mumps; Distributed lag non-linear model; Multi-city

Collence Takaingenhamo Chisita, Blessing Chiparausha, Vusi Tsabetse, Cecilia Temilola Olugbara, Moeketsi Letseka,

Remaking academic library services in Zimbabwe in the wake of COVID-19 pandemic,

The Journal of Academic Librarianship,

Volume 48, Issue 3,

2022,

102521,

ISSN 0099-1333,

https://doi.org/10.1016/j.acalib.2022.102521.

(https://www.sciencedirect.com/science/article/pii/S0099133322000374)

Abstract: The outbreak of the global COVID -19 pandemic has affected all aspects of life, access to higher education has not been out of danger as evidenced by the enforcement of official closures, enforcement lockdown and social distancing rules by governments throughout the world. However, while the COVID-19 pandemic has presented the world with numerous socioeconomic challenges, it has also helped to spur creativity and information as evidenced by the responses of academic libraries that have seen a heighted use of digital platforms to support education, teaching and research. The study sought to establish how librarians in Zimbabwe

responded to the outbreak of COVID-19 and the implications of the pandemic on library service delivery. A qualitative research was adopted for the study. Using snowballing, interviews were used to gather data beginning with the library association's branch leadership. The researchers ensured that the questions were aligned to the research objectives. The interview schedule included open and closed questions to enable participants to provide further details relating to the phenomenon under study. The participants were guaranteed their rights to consent, privacy and anonymity in the introduction of the interview schedule. An The study reveals that there has been an increase in the use online platforms for accessing information especially library's webpages, electronic books and journals. The use of library online resources from distance locations also rose following closure of campuses. Library patrons' perceptions towards electronic resources significantly improved as they realized that they were equally useful as the print. Findings from the study provide useful recommendation on how librarians can remodel their services to match new demands presented by the COVD-19 pandemic. The study provides a starting point upon which further research on the effect of COVID-19 or other similar pandemics have on library service delivery.

Keywords: COVID-19 pandemic; Academic libraries; Digital technologies; Access to information; Digital divide & Zimbabwe

Yongshi Yang, Fujun Peng, Runsheng Wang, Kai Guan, Taijiao Jiang, Guogang Xu, Jinlyu Sun, Christopher Chang,

The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China,

Journal of Autoimmunity,

Volume 109,

2020,

102434,

ISSN 0896-8411,

https://doi.org/10.1016/j.jaut.2020.102434.

(https://www.sciencedirect.com/science/article/pii/S0896841120300470)

Abstract: The 2019-nCoV is officially called SARS-CoV-2 and the disease is named COVID-19. This viral epidemic in China has led to the deaths of over 1800 people, mostly elderly or those with an underlying chronic disease or immunosuppressed state. This is the third serious Coronavirus outbreak in less than 20 years, following SARS in 2002–2003 and MERS in 2012. While human strains of Coronavirus are associated with about 15% of cases of the common cold, the SARS-CoV-2 may present with varying degrees of severity, from flu-like symptoms to death. It is currently believed that this deadly Coronavirus strain originated from wild animals at the Huanan market in Wuhan, a city in Hubei province. Bats, snakes and pangolins have been cited as potential carriers based on the sequence homology of CoV isolated from these animals and the viral nucleic acids of the virus isolated from SARS-CoV-2 infected patients. Extreme quarantine measures, including sealing off large cities, closing borders and confining people to their homes, were instituted in January 2020 to prevent spread of the virus, but by that time much of the damage had been done, as human-human transmission became evident. While these quarantine measures are necessary and have prevented a historical disaster along the lines of the Spanish flu, earlier recognition and earlier implementation of quarantine measures may have been even more effective. Lessons learned from SARS resulted in faster determination of the nucleic acid sequence and a more robust quarantine strategy. However, it is clear that finding an effective antiviral and developing a vaccine are still significant challenges. The costs of the epidemic are not limited to medical aspects, as the virus has led to significant sociological, psychological and

economic effects globally. Unfortunately, emergence of SARS-CoV-2 has led to numerous reports of Asians being subjected to racist behavior and hate crimes across the world.

Keywords: Coronavirus; SARS-CoV-2; SARS-CoV; Epidemiology; Pneumonia; Flu; Bats; Human to human transmission; Epidemic; Pandemic; Pyroptosis

Hayley Lewthwaite, Andrea Benedetti, Michael K. Stickland, Jean Bourbeau, Jordan A. Guenette, Francoic Maltais, Dacy D. Marciniuk, Denis E. O'Donnell, Benjamin M. Smith, Wan C. Tan, Dennis Jensen, S.E. AaronK, R. Chapman, P. Hernandez, D.D. Sin, B. Walker, Normative Peak Cardiopulmonary Exercise Test Responses in Canadian Adults Aged ≥40 Years, Chest,

Volume 158, Issue 6,

2020,

Pages 2532-2545,

ISSN 0012-3692,

https://doi.org/10.1016/j.chest.2020.06.074.

(https://www.sciencedirect.com/science/article/pii/S0012369220318869)

Abstract: Background

Up-to-date normative reference sets for cardiopulmonary exercise testing (CPET) are important to aid in the accurate interpretation of CPET in clinical or research settings.

Research Question

This study aimed to (1) develop and externally validate a contemporary reference set for peak CPET responses in Canadian adults identified with population-based sampling; and (2) evaluate previously recommended reference equations for predicting peak CPET responses.

Study Design and Methods

Participants were healthy adults who were ≥40 years old from the Canadian Cohort Obstructive Lung Disease who completed an incremental cycle CPET. Prediction models for peak CPET responses were estimated from readily available participant characteristics (age, sex, height, body mass) with the use of quantile regression. External validation was performed with a second convenience sample of healthy adults. Peak CPET parameters that were measured and predicted in the validation cohort were assessed for equivalence (two one-sided tests of equivalence for paired-samples and level of agreement (Bland-Altman analyses). Two one-sided tests of equivalence for paired samples assessed differences between responses in the derivation cohort using previously recommended reference equations.

Results

Normative reference ranges (5th-95th percentiles) for 28 peak CPET parameters and prediction models for 8 peak CPET parameters were based on 173 participants (47% male) who were 64 ± 10 years old. In the validation cohort (n = 84), peak CPET responses that were predicted with the newly generated models were equivalent to the measured values. Peak cardiac parameters predicted by the previously recommended reference equations by Jones and colleagues and Hansen and colleagues were significantly higher.

Interpretation

This study provides reference ranges and prediction models for peak cardiac, ventilatory, operating lung volume, gas exchange, and symptom responses to incremental CPET and presents the most comprehensive reference set to date in Canadian adults who were ≥40 years old to be identified with population-based sampling.

Keywords: cardiopulmonary exercise testing; external validation; prediction model

Behdin Nowrouzi-Kia, Rachelle Isidro, Emily Chai, Koyo Usuba, Amy Chen,

Antecedent factors in different types of workplace violence against nurses: A systematic review,
Aggression and Violent Behavior,
Volume 44,
2019,
Pages 1-7,
ISSN 1359-1789,
https://doi.org/10.1016/j.avb.2018.11.002.
(https://www.sciencedirect.com/science/article/pii/S135917891830051X)

Abstract: Aim The purpose of this systematic review is to identify the antecedent factors in different types of workplace violence (WPV) against nurses and understand its impact in order to promote safe working conditions in health care.

Background

Currently, the evidence examining antecedent factors associated with workplace violence in nursing is restricted to cross-sectional studies and a somewhat heterogeneous subject matter, thus confining the inferences that are possible. In healthcare, workplace violence towards nurses is a growing and serious public health issue and occupational hazard.

Methods

Primary papers on workplace violence in nursing were identified through a literature search in four health databases (Ovid Medline, Embase, PsychoINFO and CINAHL), using a systematic review protocol tailored to each database. After the finalization of all search strategies, another health librarian searched on November 29th, 2016, as well as an updated search on August 29th, 2017.The Critical Appraisal Skills Programme (CASP), and the Cochrane Collaboration 'Risk of bias' assessment tools were used to assess study quality. Results The study identified a total of 3309 articles before the removal of duplicate records. The mean CASP score was 8.14(±1.29) out

of a total score of 10. Antecedent factors of workplace were grouped into two categories of WPV: Type II (patient/client) and Type III (worker-on-worker).”

Discussion

The antecedent factors identified the studies need to be developed and implemented into intervention studies. Furthermore such studies need to be rigorously evaluated through a meta-analytic approach to develop robust solutions and offer recommendations to nurses and workplaces.

Implications for nursing & health policy

The identified antecedent factors build on the existing evidence related to workplace violence. This systematic review supports the need for intervention-based organizational and state level policies that are evidence-based to mitigate or prevent workplace violence among nurses.

Keywords: Workforce issues; Violence; Nursing; Antecedent factors; Work organisation

Jennifer L. Reed, Stephanie A. Prince, Andrew L. Pipe, Suzanne Attallah, Kristi B. Adamo, Heather E. Tulloch, Douglas Manuel, Kerri-Anne Mullen, George Fodor, Robert D. Reid, Influence of the workplace on physical activity and cardiometabolic health: Results of the multi-centre cross-sectional Champlain Nurses’ study,
International Journal of Nursing Studies,
Volume 81,
2018,
Pages 49-60,
ISSN 0020-7489,
https://doi.org/10.1016/j.ijnurstu.2018.02.001.
(https://www.sciencedirect.com/science/article/pii/S0020748918300361)

Abstract: Background

Nurses are the largest professional group within the health care workforce, and their work is perceived as being physically demanding. Regular physical activity helps to prevent or ameliorate cardiometabolic conditions (e.g. cardiovascular disease, diabetes). It is not known whether Canadian nurses are meeting current physical activity guidelines.

Objective

To assess the influence of the workplace on the physical activity and cardiometabolic health of nurses from hospitals in the Champlain region of Ontario, Canada.

Design

A multi-centre, cross-sectional study.

Setting

Hospitals in the Champlain Local Health Integration Network of Ontario.

Methods

Nurses wore an ActiGraph accelerometer to objectively assess levels of moderate-to-vigorous intensity physical activity measured in minutes/day in bouts ≥10 min. All completed the Perceived Workplace Environment (PWE) scale and International Physical Activity Questionnaire (IPAQ). Height, body mass, waist circumference, blood pressure and heart rate were measured, and body mass index (BMI) was determined. Each nurse's 5-year cardiovascular risk was calculated using the Harvard Score.

Findings

A total of 410 nurses (94% female; mean ± SD: age = 43 ± 12 years) from 14 hospitals participated. Nurses spent an average of 96 ± 100 min/week in bouts ≥10 min of moderate-to-vigorous intensity physical activity; 23% of nurses met recommended physical activity guidelines. Nurses working 8- vs. 12-h shifts (16 ± 16 vs. 10 ± 11 min/day, p = 0.026), fixed vs.

rotating shifts (15 ± 15 vs. 12 ± 13 min/day, p = 0.012) and casual vs. full-time (29 ± 17 vs. 13 ± 15 min/day, p < 0.001) or vs. part-time (29 ± 17 vs. 13 ± 12 min/day, p = 0.001) accumulated more moderate-to-vigorous intensity physical activity in bouts ≥10 min. The average PWE score was 2.4 ± 0.9, with no association between PWE scores and moderate-to-vigorous intensity physical activity in bouts ≥10 min (p > 0.05). Nurses working 8-h shifts, fixed shifts and in urban hospitals reported better PWE scores (p < 0.05). Nurses working fixed vs. rotating shifts had higher systolic blood pressure (median: 114 vs. 112 mmHg, p = 0.043), and nurses working in rural vs. urban hospitals had higher BMI (median: 27.8 vs. 25.6 kg/m2, p = 0.007) and waist circumference (median: 82.3 vs. 78.6 cm, p = 0.015).

Conclusions

Nurses are not meeting current physical activity guidelines (150 min of moderate-to-vigorous intensity physical activity per week in 10-min bouts), yet exceeded these recommendations when examining their continuous (i.e. non bouts) physical activity levels. No association between the PWE and moderate-to-vigorous intensity physical activity was observed. Rotating vs. fixed shifts, 12- vs. 8-h shifts, and/or full-time or part-time vs. casual hours may impede nurses' ability to meet recommended physical activity levels. The low physical activity levels and poor cardiometabolic health of Canadian nurses warrant attention.

Keywords: Cardiovascular diseases; Delivery of health care; Nurses; Motor activity; Women; Workplace

Yolanda Vasquez-Salgado, Shu-Sha Angie Guan, Dianna Alvarado, Julia Salcedo, Amanda Thwaits, Cathy Quach, Jean Pauline Serrano, Joanna Ramirez, Claudia M. Toledo-Corral, Cortisol awakening response among Latinx and Black students transitioning to college prior to and during the COVID-19 pandemic,

Current Research in Ecological and Social Psychology,

Volume 3,

2022,

100043,

ISSN 2666-6227,

https://doi.org/10.1016/j.cresp.2022.100043.

(https://www.sciencedirect.com/science/article/pii/S2666622722000107)

Abstract: Globally, the COVID-19 (coronavirus disease 2019) pandemic has resulted in abrupt shifts in ecological and social environments, including school contexts, which became predominately virtual. This study (1) examines the role of the COVID-19 pandemic (transitioning to college prior to vs. during the COVID-19 pandemic) on cortisol awakening response (CAR) – a biological marker of chronic psychosocial stress – and university belonging among Latinx and Black first-year college students; and (2) explores whether university belonging serves as a mediator in the relationship between the COVID-19 pandemic and CAR. Latinx and Black students who were in their first semester at a four-year public university in Los Angeles County – one of the United States' hot spots for COVID-19, were recruited for this study. Across two separate cohorts (fall 2019, fall 2020), participants (N = 136) completed an online survey and provided salivary samples to assess for morning cortisol levels. Findings revealed that students who transitioned to college during the COVID-19 pandemic exhibited a flatter CAR and lower levels of belonging than students who transitioned to college prior to the COVID-19 pandemic. Implications for intervention, programs and policies aimed at fostering positive transitions to college during the COVID-19 pandemic and beyond are discussed.

Keywords: COVID-19 pandemic; Transition to college; Cortisol awakening response; University belonging; Latinx students; Black students

Stephen D. Nimer, Jennifer Chapman, Lisa Reidy, Alvaro Alencar, YanYun Wu, Sion Williams, Lazara Pagan, Lauren Gjolaj, Jessica MacIntyre, Melissa Triana, Barbara Vance, David Andrews, Yao-Shan Fan, Yi Zhou, Octavio Martinez, Monica Garcia-Buitrago, Carolyn Cray, Mustafa Tekin, Jacob L. McCauley, Philip Ruiz, Paola Pagan, Walter Lamar, Maritza Alencar, Daniel Bilbao, Silvia Prieto, Maritza Polania, Maritza Suarez, Melissa Lujardo, Gloria Campos, Michele Morris, Bhavarth Shukla, Alberto Caban-Martinez, Erin Kobetz, Dipen J. Parekh, Merce Jorda,
A How-to Guide to Building a Robust SARS-CoV-2 Testing Program at a University-Based Health System,
Academic Pathology,
Volume 7,
2020,
2374289520958200,
ISSN 2374-2895,
https://doi.org/10.1177/2374289520958200.
(https://www.sciencedirect.com/science/article/pii/S2374289521001214)
Abstract: When South Florida became a hot spot for COVID-19 disease in March 2020, we faced an urgent need to develop test capability to detect SARS-CoV-2 infection. We assembled a transdisciplinary team of knowledgeable and dedicated physicians, scientists, technologists, and administrators who rapidly built a multiplatform, polymerase chain reaction- and serology-based detection program, established drive-through facilities, and drafted and implemented guidelines that enabled efficient testing of our patients and employees. This process was extremely complex, due to the limited availability of needed reagents, but outreach to our research scientists and multiple diagnostic laboratory companies, and government officials enabled us to implement both

Food and Drug Administration authorized and laboratory-developed testing–based testing protocols. We analyzed our workforce needs and created teams of appropriately skilled and certified workers to safely process patient samples and conduct SARS-CoV-2 testing and contact tracing. We initiated smart test ordering, interfaced all testing platforms with our electronic medical record, and went from zero testing capacity to testing hundreds of health care workers and patients daily, within 3 weeks. We believe our experience can inform the efforts of others when faced with a crisis situation.

Keywords: COVID-19; testing; academia; university; program

Prasath Selvaraj, Anbu Krishnamoorthy, Shankavi Vivekanandhan, Haritha Manoharan,
COVID-19: A crisis or fortune? Examining the relationship between nature relatedness and mental wellbeing during the pandemic,
Heliyon,
Volume 8, Issue 4,
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e09327,
ISSN 2405-8440,
https://doi.org/10.1016/j.heliyon.2022.e09327.
(https://www.sciencedirect.com/science/article/pii/S2405844022006156)

Abstract: With the progression of the coronavirus disease (COVID-19), lockdowns were introduced, movements were restricted, and the people were confined to their homes. On the other side, the social distancing measures and the shutdown of movements showed a significant impact on the ecosystem resulting in an explicit revamp of nature. These nature rejuvenation and home confinement measures were presumed to improve the human-nature connection and affect

the wellbeing of the individuals. Guided by this aspect, the present study attempted to examine nature relatedness and mental wellbeing of the Indian population during the COVID-19 pandemic. We further tried to investigate the relationship between the two considering age and gender as moderators. In addition, the association between nature relatedness and various socio-demographic factors were also inquired. A three-week online survey was conducted among the general Indian population with the age group ranging from 18 to 65 years. Results exhibited a higher nature relatedness and moderate mental wellbeing among the individuals. The association between nature relatedness and mental wellbeing produced a significant positive relationship among the sample. Meanwhile, individuals with higher nature relatedness were found to be female, unemployed, research scholars, and possessing ‘very liberal’ political ideology. When assessed for potential moderators, neither gender nor age influenced the relationship between nature relatedness and mental wellbeing. Possible explanations of our findings were discussed that shall provide constructive directions for future research in the area of human-nature connection and public health.

Keywords: COVID-19; India; Nature relatedness; Pandemic; Political ideology; Wellbeing

Abhishek Verma, J. Maiti, G. Boustras,

Analysis of categorical incident data and design for safety interventions using axiomatic design framework,

Safety Science,

Volume 123,

2020,

104557,

ISSN 0925-7535,

https://doi.org/10.1016/j.ssci.2019.104557.

(https://www.sciencedirect.com/science/article/pii/S092575351932168X)

Abstract: Although analysing categorical data from incident investigation reports provides meaningful associations amongst causal factors of incidents, however, to date, no studies considered these associations in designing actionable interventions for safety improvement. We propose a methodology using descriptive analytics and axiomatic design framework. In this study, we have analysed injury, and 'property-damage' data, collected for 45 months from a large integrated steel plant. The data are analysed using the contingency table, Cramer's V, Phi coefficients (ϕ) and Fisher's exact test. The 'wire-making division' is the most injury-prone. Unsafe acts done by fellow workers are significantly causing injuries in 'support services', maintenance and 'steel-making'. The property-damage cases are mostly reported in 'steel-making division', and caused by material-handling, crane-dashing, toxic-chemical, hot-metal and process-related incidents. It is also found that SOP inadequacy and non-compliance are significantly associated with 'property-damage' incidents. The key interventions from axiomatic design are as follows. For process-related incidents, regular inspection and maintenance of safety-critical equipment should be done. Safety-critical instrument and alarms can also be used to monitor safe operating limits of processes. Unsafe acts by fellow workers are the result of lack of coordination and communication. So, the management should identify and provide the types of safety training necessary to improve the same. The material-handling related problems can be handled through improved staff competency and communication. To address the SOP related issues, operating procedures should be reviewed, revised and communicated regularly.

Keywords: Incident investigation; Categorical data analysis; Safety interventions; Axiomatic design; Data mining; Accident causation

Christelle Schang, Jonathan Schmidt, Li Gao, David Bergmann, Tara McCormack, Rebekah Henry, David McCarthy,

Rainwater for residential hot water supply: Managing microbial risks,

Science of The Total Environment,

Volume 782,

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146889,

ISSN 0048-9697,

https://doi.org/10.1016/j.scitotenv.2021.146889.

(https://www.sciencedirect.com/science/article/pii/S0048969721019598)

Abstract: There is growing interest in using alternative water sources such as rainwater harvesting and treatment systems to supplement traditional sources and secure a stable supply. For such systems, it is important to ensure adequate water quality, as microbial contamination can be a risk factor in rainwater. The primary objective of this study was to provide proof-of-concept for the microbial treatment capacity of a residential scale rain-to-hot-water treatment system to be installed in Melbourne, Australia. The system consists of a filtration, UV and heat-pump hot water unit, and disinfects roofwater prior to use of the hot water for bath, shower and laundry. The system's efficiency was evaluated using long-term challenge tests investigating the full system and each of the separate components. The microbial treatment performance was assessed based on the systems' ability to treat high levels of E. coli, E. faecalis, Campylobacter, Salmonella and MS2 phage under challenging conditions; with varying flow rates (10-40 L/min) and microbe concentrations (104-105unit/L), and in scenarios of a power outage. Over a compressed year of operation, the full rain-to-hot-water treatment system was extremely efficient at reducing concentrations of E. coli, E. faecalis, Campylobacter, Salmonella and FRNA phages,

with log reductions ranging from the lowest average of 2.1log reductions for Salmonella to a maximum of >5.1log for E. coli. Most of the treatment was provided by the UV system, and any remaining microbes present after this point were deactivated by the heat-pump system (provided that the water was given enough time to warm up). Additional modelling work showed that UV intensity, UV transmissivity and contact time (for the UV system) and temperature (for the heat-pump hot water system) could be used as parameters to predict microbial treatment performance of the system, indicating that these easily-measurable parameters could assist with ongoing operation optimisation and maintenance of such systems.

Keywords: Rainwater; Domestic hot water; Bacteria; Pathogens; Viruses; Protozoa; Challenge test; UV validation

Natalie Spitzer, Maile T. Phillips, Wendy Chow, Thomas W. Mangione,

Factors associated with life jacket use among cabin sailboat and day sailor boaters in the United States,

Journal of Safety Research,

Volume 65,

2018,

Pages 101-114,

ISSN 0022-4375,

https://doi.org/10.1016/j.jsr.2018.02.002.

(https://www.sciencedirect.com/science/article/pii/S0022437517306096)

Abstract: Introduction

In 2015, drowning accounted for 68% of the 626 recreational boating related deaths in the United States. Although life jackets are estimated to prevent between 50% to 80% of boating deaths,

approximately 83% of sailboat-related drowning victims were reported to not be wearing life jackets. Life jacket use among adult boaters has remained consistently low across most boat types and may vary by boater, boating, and environmental conditions. Although many risky environmental and boating factors may be associated with a higher risk of boating death, drowning occurs in all situations and it is useful to understand adult life jacket wearing behaviors in differing boating situations.

Methods

This study uses observational survey data from 61318 adult sailors collected during the summer months of 1999 – 2017 from 124 selected study sites across 30 states in the US. Life jacket use was compared for day sailors and cabin sailboats by multiple boating, boater, and environmental conditions using Chi-square tests for equality of proportions. Results of these tests led to a choice of 3 informative and scientifically compelling variables to summarize variation in life jacket use for each sailboat type. Odds ratios were calculated comparing life jacket use from each boating situation to the lowest risk situation as determined by the 3 selected variables. These variables were represented in a tree diagram, detailing the additive impact of each factor. Following these analyses, all boating conditions were categorized to be risky or non-risky and a count variable was created for each observation based on the number of risks present. Cochran-Armitage trend tests were conducted to test for linearity in life jacket use for both boat types.

Results

The overall life jacket wear rate was higher among adults in day sailor sailboats (51.6%) compared to cabin sailboats (13.8%) and in all measured demographic, boating, and environmental circumstances. Comparing high-risk cabin sailboat conditions of low water temperatures, small boat size, and high wind speed to the lowest-risk situation accounted for a 23.3% range in life jacket wear rate (OR=4.7). Comparing high-risk day sailor sailboat conditions

of small boat size, one boater on board, and choppy/rough wave height to the lowest-risk situation accounted for a 39.3% range in life jacket wear rate (OR=5.9). For both boat types, the number of risks present and life jacket wear rate exhibited a statistically significant positive linear relationship at $p<0.0001$.

Conclusion

Study results suggest that boaters are aware of the connection between life jacket use and drowning prevention and are more likely to wear life jackets when boating in conditions perceived to be risky.

Practical applications

Boating safety promotion efforts should recommend adult life jacket use in all boating situations, as seemingly non-risky conditions may still result in drownings.

Keywords: Sailboats; Boating safety; Life jackets; Drowning prevention; Boating risk

Ushtar Arshad, Syed Ali Ammar Taqvi, Azizul Buang,

Modelling of the minimum ignition temperature (MIT) of corn dust using statistical analysis and artificial neural networks based on the synergistic effect of concentration and dispersion pressure,

Process Safety and Environmental Protection,

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(https://www.sciencedirect.com/science/article/pii/S0957582020319674)

Abstract: Corn dust is a highly energetic substance and frequently found in the food manufacturing industries. It not only poses occupational safety hazards such as suffocation or lung disorders for exposed persons but is often extremely explosible in ignition sensitive environment. This probability of explosion can be assessed and minimised with in-depth knowledge of controlling parameters/physical properties that trigger the ignition. This research takes into account the minimum ignition temperature (MIT), which is the control parameter for explosion risk assessment. MIT relies on multiple factors, such as moisture content, particle size, dust concentration, dispersion pressure, humidity and environmental temperature. In this study, the ignition of corn dust clouds was analysed using a Godbert Greenwald furnace for different combinations of dispersion pressure and concentrations. Test findings revealed that the minimum ignition temperature rises with a decrease in particle size. However, the minimum ignition temperature decreases with increased dispersion pressure and concentration until a specific value known as optimal value for ignition. Moreover, this work focuses on a statistical approach of polynomial surface fitting to forecast the MIT based on the combined impact of concentration and dispersion pressure on MIT for corn dust in a real-time experiment. The minimum value of the Bayesian Information Criterion (BIC) was used to select the most appropriate polynomial model due to its authenticity and strong reputation. An artificial neural network (ANN) is also used as a predictive tool to develop a model that can forecast the MIT with a defined combination of dispersion pressures and corn dust concentrations. As soon as an appropriate estimation of this minimum ignition temperature of the combustible dust is confirmed, it is possible to ensure that the temperatures of the surrounding hot surfaces do not rise to that point to prevent the explosion. The predictive results obtained from ANN were found to be good when compared with the polynomial surface fit. Several models with different numbers of neurons have been trained with different transfer functions. For the training, validation, and test phases, R values are around 1.0,

i.e., 0.9863, 0.9930, and 0.9893, respectively. The overall R value was 0.9875 for the proposed network. The findings were considered to be acceptable as the overall value of R was close to 1.0. The network obtained sufficiently comparable findings with the research conducted by Kasalova and Balog.

Keywords: Minimum ignition temperature; Corn dust; ANN modelling; Gobert-Greenwald furnace

Seraphin Djaoue, Gabriel Guilsou Kolaye, Hamadjam Abboubakar, Ado Adamou Abba Ari, Irepran Damakoa,

Mathematical modeling, analysis and numerical simulation of the COVID-19 transmission with mitigation of control strategies used in Cameroon,

Chaos, Solitons & Fractals,

Volume 139,

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110281,

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https://doi.org/10.1016/j.chaos.2020.110281.

(https://www.sciencedirect.com/science/article/pii/S0960077920306779)

Abstract: In this paper, we formulated a general model of COVID-19model transmission using biological features of the disease and control strategies based on the isolation of exposed people, confinement (lock-downs) of the human population, testing people living risks area, wearing of masks and respect of hygienic rules. We provide a theoretical study of the model. We derive the basic reproduction number R0which determines the extinction and the persistence of the infection. It is shown that the model exhibits a backward bifurcation at R0=1. The sensitivity

analysis of the model has been performed to determine the impact of related parameters on outbreak severity. It is observed that the asymptomatic infectious group of individuals may play a major role in the spreading of transmission. Moreover, various mitigation strategies are investigated using the proposed model. A numerical evaluation of control strategies has been performed. We found that isolation has a real impact on COVID-19transmission. When efforts are made through the tracing to isolate 80% of exposed people the disease disappears about 100 days. Although partial confinement does not eradicate the disease it is observed that, during partial confinement, when at least 10% of the partially confined population is totally confined, COVID-19 spread stops after 150 days. The strategy of massif testing has also a real impact on the disease. In that model, we found that when more than 95% of moderate and symptomatic infected people are identified and isolated, the disease is also really controlled after 90 days. The wearing of masks and respecting hygiene rules are fundamental conditions to control the COVID-19.

Keywords: Basic reproduction number; Extinction; Persistence; Backward; Quarantine; Testing; Masks

Maria A. Zoran, Roxana S. Savastru, Dan M. Savastru, Marina N. Tautan, Laurentiu A. Baschir, Daniel V. Tenciu,

Exploring the linkage between seasonality of environmental factors and COVID-19 waves in Madrid, Spain,

Process Safety and Environmental Protection,

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https://doi.org/10.1016/j.psep.2021.06.043.

(https://www.sciencedirect.com/science/article/pii/S0957582021003360)

Abstract: Like several countries, Spain experienced a multi wave pattern of COVID-19 pandemic over more than one year period, between spring 2020 and spring 2021. The transmission of SARS-CoV-2 pandemics is a multi-factorial process involving among other factors outdoor environmental variables and viral inactivation.This study aims to quantify the impact of climate and air pollution factors seasonality on incidence and severity of COVID-19 disease waves in Madrid metropolitan region in Spain. We employed descriptive statistics and Spearman rank correlation tests for analysis of daily in-situ and geospatial time-series of air quality and climate data to investigate the associations with COVID-19 incidence and lethality in Madrid under different synoptic meteorological patterns. During the analyzed period (1 January 2020-28 February 2021), with one month before each of three COVID-19 waves were recorded anomalous anticyclonic circulations in the mid-troposphere, with positive anomalies of geopotential heights at 500 mb and favorable stability conditions for SARS-CoV-2 fast diffusion. In addition, the results reveal that air temperature, Planetary Boundary Layer height, ground level ozone have a significant negative relationship with daily new COVID-19 confirmed cases and deaths. The findings of this study provide useful information to the public health authorities and policymakers for optimizing interventions during pandemics.

Keywords: COVID-19 disease; Synoptic atmospheric circulation; Air quality; Seasonal variability of climate and Planetary Boundary Layer height; NOAA satellite data

Omran Ahmadi, Seyed Bagher Mortazavi, Hadi Pasdarshahri, Hassan Asilian Mahabadi, Kazem Sarvestani,

Modeling of boilover phenomenon consequences: Computational fluid dynamics (CFD) and empirical correlations,

Process Safety and Environmental Protection,

Volume 129,

2019,

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https://doi.org/10.1016/j.psep.2019.05.045.

(https://www.sciencedirect.com/science/article/pii/S0957582018314101)

Abstract: In the present study, empirical correlations were applied to predict the time to boilover and its consequences. Next, a computational fluid dynamics (CFD) model was applied for the simulation of boilover consequences based on the resulting incident radiative heat flux. Empirical correlations, and the Fire Dynamic Simulator (FDS) were compared with a crude oil boilover experiment carried out in a 1m diameter pan (small-scale). FDS predictions were consistent with experimental results. A case study concerning the boilover accident in Milford Haven with a 78m diameter tank (large-scale) was performed with the CFD model and empirical correlations. A comparison of the simulation results and accident data demonstrated that FDS was able to predict the radiation heat flux of the boilover in the target area in agreement with real accident data. The time to boilover correlations gave results in agreement with experimental and real accident data while consequence prediction correlations exaggerated the radiation heat flux and fireball height and diameter. It is concluded that an integrated approach including empirical correlations for the prediction of time to boilover and FDS for the prediction of the radiation heat flux in the target area, provide realistic results for prediction of time to boilover and its consequences.

Keywords: Boilover; CFD; Consequence analysis; Empirical correlation; FDS; Time to boilover

S. Balachandar, S. Zaleski, A. Soldati, G. Ahmadi, L. Bourouiba,

Host-to-host airborne transmission as a multiphase flow problem for science-based social distance guidelines,

International Journal of Multiphase Flow,

Volume 132,

2020,

103439,

ISSN 0301-9322,

https://doi.org/10.1016/j.ijmultiphaseflow.2020.103439.

(https://www.sciencedirect.com/science/article/pii/S0301932220305498)

Abstract: The COVID-19 pandemic has strikingly demonstrated how important it is to develop fundamental knowledge related to the generation, transport and inhalation of pathogen-laden droplets and their subsequent possible fate as airborne particles, or aerosols, in the context of human to human transmission. It is also increasingly clear that airborne transmission is an important contributor to rapid spreading of the disease. In this paper, we discuss the processes of droplet generation by exhalation, their potential transformation into airborne particles by evaporation, transport over long distances by the exhaled puff and by ambient air turbulence, and their final inhalation by the receiving host as interconnected multiphase flow processes. A simple model for the time evolution of droplet/aerosol concentration is presented based on a theoretical analysis of the relevant physical processes. The modeling framework along with detailed experiments and simulations can be used to study a wide variety of scenarios involving breathing, talking, coughing and sneezing and in a number of environmental conditions, as humid or dry atmosphere, confined or open environment. Although a number of questions remain open on the

physics of evaporation and coupling with persistence of the virus, it is clear that with a more reliable understanding of the underlying flow physics of virus transmission one can set the foundation for an improved methodology in designing case-specific social distancing and infection control guidelines.

Keywords: Airborne transmission; Sneezing; Coughing; Droplet evaporation; Droplet nuclei; Aerosol inhalation; Filtration efficiency of mask

Robin Hanson, Lars Medbo, Cecilia Berlin, Jonas Hansson,

Manual picking from flat and tilted pallet containers,

International Journal of Industrial Ergonomics,

Volume 64,

2018,

Pages 199-212,

ISSN 0169-8141,

https://doi.org/10.1016/j.ergon.2017.07.001.

(https://www.sciencedirect.com/science/article/pii/S0169814116302359)

Abstract: Manual picking operations commonly occur both in distribution settings and within manufacturing industry and may consume large proportions of the working day for operators, with associated potential problems of poor postural ergonomics and low time efficiency. As a remedy to such problems, alternative material layouts like tilted material pallets may be an attractive solution. This study provides quantitative empirical evidence comparing the relative merits and drawbacks of flat and tilted pallet configurations, with regard to physical ergonomic loading and time consumption. This was explored with an experimental setup at the site of an industrial company, where various representative picking operators were observed while

emptying flat and tilted pallets. The observation was video recorded and subjected to a time study and Rapid Entire Body Assessment (REBA). Results showed that there are differences in picking time and physical workload depending on where in the pallet the picking action takes place, and that flat and tilted pallets bring different postural opportunities and challenges for different operator percentiles in the working population. An overview of postural ergonomics consequences and their associated risk levels are shown, and the results serve to further increase the understanding of which factors are affected by choosing between a tilted or flat component presentation. This understanding is highly relevant to industry, where it can contribute to the design of both efficient and ergonomically sound processes for manual picking operations.
Keywords: Material handling; Order picking; Large containers; Time efficiency; Physical ergonomics

Lei li, Juntao Wang, Zhuodong Yang, Geng Luo, Kai Tong, Jin Zhao, Jifeng Song,
An optical fiber daylighting system with large Fresnel lens,
Energy Procedia,
Volume 152,
2018,
Pages 342-347,
ISSN 1876-6102,
https://doi.org/10.1016/j.egypro.2018.09.146.
(https://www.sciencedirect.com/science/article/pii/S1876610218306908)
Abstract: Because of flexible installation and natural spectrum, the concentrated sunlight transmission systems via PMMA (Polymethyl methacrylate) fibers for indoor illumination are concerned widely in areas of building energy saving. Due to the long-term indoor work, the daily

working population in cities lacks of natural light and is susceptible to various diseases. Therefore, from the health point of view, it is necessary to develop deep indoor daylighting. In this work, a sunlight concentration and transmission system was developed and tested, which uses a Fresnel lens with a diameter of 1m to achieve large flux collection. A reflection design of light path was adopted to resolve the problem of long focal length of the Fresnel lens. A hot mirror and a homogenizer were used to protect the optic fiber bundle from burned by high temperature. The results showed that the daylighting efficiency is about 11%-13%. The operability of the equipment was verified through experiments, proving that the equipment can be combined with buildings for daylighting. It is hoped that this research will be of some reference value to the design of optical fiber daylighting systems in buildings.

Keywords: daylighting; optic fibers; transmission

Clare Faurie, Blesson M. Varghese, Jingwen Liu, Peng Bi,

Association between high temperature and heatwaves with heat-related illnesses: A systematic review and meta-analysis,

Science of The Total Environment,

Volume 852,

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https://doi.org/10.1016/j.scitotenv.2022.158332.

(https://www.sciencedirect.com/science/article/pii/S0048969722054316)

Abstract: Background

A large body of scientific evidence has established the impact of increased temperatures on human health. There is a relationship between extreme heat (either incremental temperature increase or heatwaves), and heat-related illnesses. This study aimed to collate the research findings on the effects of extreme heat on heat-related illness in a systematic review and meta-analysis, and to provide robust evidence for needed public health intervention.

Methods

We conducted a search of peer-reviewed articles in three electronic databases (PubMed, EMBASE, and SCOPUS), from database inception until January 2022. A random-effects meta-analysis model was used to calculate the pooled relative risks (RRs) of the association between high temperature and heat-related illness outcomes. A narrative synthesis was also performed for studies analysing heatwave effects. Assessment of evidence was performed in three parts: individual study risk of bias; quality of evidence across studies; and overall strength of evidence.

Results

A total of 62 studies meeting the eligibility criteria were included in the review, of which 30 were qualified to be included in the meta-analysis. The pooled results showed that for every 1 ℃ increase in temperature, when measured from study-specific baseline temperatures, direct heat illness morbidity and mortality increased by 18 % (RR 1.18, 95%CI: 1.16–1.19) and 35 % (RR 1.35, 95%CI: 1.29–1.41), respectively. For morbidity, the greatest increase was for direct heat illness (RR 1.45, 95%CI: 1.38–1.53), compared to dehydration (RR 1.02, 95%CI: 1.02–1.03). There was higher risk for people aged >65 years (RR 1.25; 95 % CI: 1.20–1.30), and those living in subtropical climates (RR 1.25; 95 % CI: 1.21–1.29).

Conclusion

Increased temperature leads to higher burden of disease from heat-related illness. Preventative efforts should be made to reduce heat-related illness during hot weather, targeting on the most vulnerable populations. This is especially important in the context of climate change.

Keywords: Heatwaves; Climate change; Heat related illness; Heatstroke; Dehydration; Relative risk

Carmina Pérez-Guerrero, Adriana Palacios, Gilberto Ochoa-Ruiz, Vahid Foroughi, Elsa Pastor, Miguel Gonzalez-Mendoza, Luis Eduardo Falcón-Morales,

Experimental large-scale jet flames' geometrical features extraction for risk management using infrared images and deep learning segmentation methods,

Journal of Loss Prevention in the Process Industries,

Volume 80,

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104903,

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https://doi.org/10.1016/j.jlp.2022.104903.

(https://www.sciencedirect.com/science/article/pii/S0950423022001796)

Abstract: Jet fires are relatively small and have the least severe effects among the diverse fire accidents that can occur in industrial plants; however, they are usually involved in a process known as the domino effect, that leads to more severe events, such as explosions or the initiation of another fire, making the analysis of such fires an important part of risk analysis. This research work explores the application of deep learning models in an alternative approach that uses the semantic segmentation of jet fires flames to extract the flame's main geometrical attributes, relevant for fire risk assessments. A comparison is made between traditional image processing

methods and some state-of-the-art deep learning models. It is found that the best approach is a deep learning architecture known as UNet, along with its two improvements, Attention UNet and UNet++. The models are then used to segment a group of vertical jet flames of varying pipe outlet diameters to extract their main geometrical characteristics. Attention UNet obtained the best general performance in the approximation of both height and area of the flames, while also showing a statistically significant difference between it and UNet++. UNet obtained the best overall performance for the approximation of the lift-off distances; however, there is not enough data to prove a statistically significant difference between Attention UNet and UNet++. The only instance where UNet++ outperformed the other models, was while obtaining the lift-off distances of the jet flames with 0.01275 m pipe outlet diameter. In general, the explored models show good agreement between the experimental and predicted values for relatively large turbulent propane jet flames, released in sonic and subsonic regimes; thus, making these radiation zones segmentation models, a suitable approach for different jet flame risk management scenarios.
Keywords: Jet fire; Risk management; Deep learning; Semantic segmentation; Flame height; Lift-off

Keerththana Kumareswaran, I. Rajapaksha, G.Y. Jayasinghe,
Energy poverty, occupant comfort, and wellbeing in internally displaced people’s residences in Sri Lanka,
Energy and Buildings,
Volume 236,
2021,
110760,
ISSN 0378-7788,

https://doi.org/10.1016/j.enbuild.2021.110760.
(https://www.sciencedirect.com/science/article/pii/S037877882100044X)

Abstract: Internally displaced people (IDP) due to conflict and violence were estimated as 41.3 million in 55 countries as the end of the year 2019, the highest figure ever recorded. Sri Lanka has not yet prioritized the health and wellbeing of households in building designing, with the emerging heat island effect making the lives more desperate for IDP. This study focused on the effect of energy poverty on occupant comfort in determining the quality of life of people and adaptive behaviors to manage heat strain in overheated interiors of rehabilitated residences in Jaffna, Sri Lanka. Field investigations consisted of personal monitoring, questionnaire surveying and physical measurements in four clusters of rehabilitation residence programmes in four regions. The study found that IDP were suffering from hidden energy poverty, with mean electricity consumption of 52 kWh per household per month. Residents have marginal (29%) access to clean fuels for cooking and accountable for an abnormal particulate matter count of 360 951 particles per cubic centimeter. Findings explicitly revealed the presence of overheated spaces with mean thermal preference of −0.6 conveying the need of cooler indoor environment. People tend to exhibit behavioral adjustments to cope up with prevailing extreme temperatures. Severity of heat stress informed by modified wet bulb globe temperature (WBGT) reporting 90% (28–31 °C) of households facing higher risk of heat strain while remaining 10% (>31 °C) are in hazardous situation. Predicted mean vote (PMV) was 1.29 explains warm sensation with predicted percentage of dissatisfied (PPD) 44.1% not complying to ASHRAE 55 standards. This detrimental combination of fuel poverty, lack of thermal comfort, and unacceptable indoor air quality has been a significant factor for 62% of the residences reporting at least one type of illness and being more prone to cardiovascular and respiratory disorders (37%). Thus, the study

evidenced the presence of energy poverty and overheated interiors in the IDP's residences in hot tropics of Sri Lanka.

Keywords: Adaptive behavior; Energy poverty; Heat stress; Internally displaced persons; Occupant comfort; Passive design buildings

Xinwei Ren, Lan Wang, Jingchun Tang, Hongwen Sun, John P. Giesy,

Combined effects of degradable film fragments and micro/nanoplastics on growth of wheat seedling and rhizosphere microbes,

Environmental Pollution,

Volume 294,

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118516,

ISSN 0269-7491,

https://doi.org/10.1016/j.envpol.2021.118516.

(https://www.sciencedirect.com/science/article/pii/S0269749121020984)

Abstract: Multiple sources of microplastics (MPs) in farmland could result in the changing of microbial community and the plant growth. Most studies of MPs in agricultural system have focused on the effects of single types of MPs on growth of plants, while neglect interactions between multiple types of MPs. In this study a pot-experiment was conducted to investigate the effects of multiple types of MPs, including polystyrene beads: M1, 5 μm, M2, 70 nm and degradable mulching film (DMF) fragments on growth of wheat seedlings and associated rhizosphere microbial community. CKD (adding DMF) significantly reduced plant height and base diameter of wheat seedlings. DMF in combination with M2, significantly increased plant height and aboveground biomass, but decreased the base diameter. Actinobacteria was the

dominant taxa in the rhizosphere bacterial community in various treatments. PCoA analysis showed that the bacterial composition in M2HD (100 mg kg−1 M2 with DMF) was significantly different from that of CKD and M2LD (10 mg kg−1 M2 with DMF). At the level of genera, the dominant fungi in CKD and M2LD were in the genus Fusarium, which is the cause of wheat fusarium blight and Alternaria, which results in decreased base diameter. In CK (control group) and M2HD, Blastobotrys exhibited the greatest abundance, which assisted wheat seedlings in resisting Verticillium disease. Cluster and PCoA analysis showed the fungal composition in CKD was significantly different from CK, M2LD and M2HD. These findings suggest MPs potentially have selective effects on pathogens that affect growth of plants and potentially safety of the food.

Keywords: Multi-sources; Microplastics; Degradable mulching film fragments; Polystyrene; Rhizosphere microbial community; Seedling

Anamai Thetkathuek, Parvena Meepradit, Teerayut Sa-ngiamsak,

A Cross-sectional Study of Musculoskeletal Symptoms and Risk Factors in Cambodian Fruit Farm Workers in Eastern Region, Thailand,

Safety and Health at Work,

Volume 9, Issue 2,

2018,

Pages 192-202,

ISSN 2093-7911,

https://doi.org/10.1016/j.shaw.2017.06.009.

(https://www.sciencedirect.com/science/article/pii/S2093791117300094)

Abstract: Background

Work-related musculoskeletal disorders are accumulative disorders that are most frequently found in agricultural farmers. The purpose of this study was to investigate factors that affect symptoms resulting from work-related musculoskeletal disorders among Cambodian farm workers working in fruit plantations in the eastern region of Thailand.

Methods

The Nordic Musculoskeletal Questionnaire, Rapid Upper Limb Assessment, and Hazard Zone Jobs Checklist techniques were used to interview 861 farmers who participated in the study.

Results

The data showed that men who had been working for >10 years were more at risk of neck pain than those working for <1 year with adjusted odds ratio (aOR) 1.66, 95% confidence interval (CI) (1.90, 14.5). Among women those who had been working for >10 years experienced lower back pain with aOR 8.13, 95% CI (1.04, 63.74), compared with those who had been working for <1 year. Men whose tasks required raising the arms above shoulder height had a risk factor contributing to neck pain of aOR 1.68, 95% CI (1.08, 2.61) when compared with those who did not work with this posture, and women had aOR 1.82, 95% CI (1.07, 3.12) when compared with those who did not work with this posture.

Conclusion

Based on the results of this study, it is recommended that work-related health conditions are monitored in migrant plantation workers to reduce the risks of musculoskeletal disorders.

Keywords: agriculture; Cambodian workers; eastern Thailand; migrant; musculoskeletal disorder

Yu Xue WANG, Li ZHANG, Chun Jun LI, Xin QI, Ya Qi FAN, Jiang Shan HE, Pei GUO, Jia Lin HU, Shuo CHEN, Yu Jie NIU, Feng LIU, Rong ZHANG, Qiang LI, Shi Tao MA, Mian Zhi ZHANG, Cheng Lin HONG, Min Ying ZHANG,

Predicted 10-year Cardiovascular Disease Risk and Its Association with Sleep Duration among Adults in Beijing-Tianjin-Hebei Region, China,

Biomedical and Environmental Sciences,

Volume 34, Issue 10,

2021,

Pages 803-813,

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https://doi.org/10.3967/bes2021.109.

(https://www.sciencedirect.com/science/article/pii/S089539882100129X)

Abstract: Objective

The study aims to predict 10-year cardiovascular disease (CVD) risk and explore its association with sleep duration among Chinese urban adults.

Methods

We analyzed part of the baseline data of a cohort that recruited adults for health screening by cluster sampling. The simplified Pittsburgh Sleep Quality Index (PSQI) and Framingham 10-year risk score (FRS) were used to measure sleep duration and CVD risk. Demographic characteristics, personal history of chronic diseases, lifestyle factors were collected using a questionnaire. Height, weight, total cholesterol (TC), and high-density lipoprotein cholesterol (HDL-C) were also measured. Multiple logistic regression models were performed to explore the association of sleep duration with the predicted CVD risk.

Results

We included 31, 135 participants (median age 44 years, 53.02% males) free of CVD, cerebral stroke, and not taking lipid-lowering agents. Overall, 14.05%, and 25.55% of participants were at medium and high predicted CVD risk, respectively. Short sleep was independently associated

with increased odds of medium to high risk of predicted 10-year CVD among males (OR = 1.10; 95% CI: 1.01–1.19) and increased odds of medium to high and high risk of predicted 10-year CVD among females (OR = 1.23; 95% CI: 1.08–1.40; OR = 1.27; 95% CI: 1.11–1.44). In contrast, long sleep had no association with cardiovascular risk.

Conclusion

A substantial number of adults free of CVD were at high 10-year CVD risk. Short sleep was associated with increased odds of predicted CVD risk.

Keywords: Predicted 10-year CVD risk; Framingham risk score; Sleep duration

Guning Liu, Katie Moore, Wei-Chung Su, George L. Delclos, David Gimeno Ruiz de Porras, Bing Yu, Hezhong Tian, Bin Luo, Shao Lin, Grace Tee Lewis, Elena Craft, Kai Zhang, Chemical explosion, COVID-19, and environmental justice: Insights from low-cost air quality sensors,

Science of The Total Environment,

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(https://www.sciencedirect.com/science/article/pii/S0048969722049804)

Abstract: Objectives

To examine the impact of the Intercontinental Terminals Company (ITC) fire and COVID-19 on airborne particulate matter (PM) concentrations and the PM disproportionally affecting communities in Houston using low-cost sensors.

Methods

We compared measurements from a network of low-cost sensors with a separate network of monitors from the Environmental Protection Agency (EPA) in the Houston metropolitan area from Mar 18, 2019, to Dec 31, 2020. Further, we examined the associations between neighborhood-level sociodemographic status and air pollution patterns by linking the low-cost sensor data to EPA environmental justice screening and mapping systems.

Findings

We found increased PM levels during ITC fire and pre-COVID-19, and lower PM levels after the COVID-19 lockdown, comparable to observations from the regulatory monitors, with higher variations and a greater number of locations with high PM levels detected. In addition, the environmental justice analysis showed positive associations between higher PM levels and the percentage of minority, low-income population, and demographic index.

Implication

Our study indicates that low-cost sensors provide pollutant measures with higher spatial variations and a better ability to identify hot spots and high peak concentrations. These advantages provide critical information for disaster response and environmental justice studies.

Synopsis

We used measurements from a low-cost sensor network for air pollution monitoring and environmental justice analysis to examine the impact of anthropogenic and natural disasters.

Keywords: Low-cost sensor; Particulate matter; Environmental justice; Industrial fire accident; COVID-19; Disaster; Air quality monitoring

Hua Zong, Manqing Yao, Yuqian Tang, Han Chen,

Assessing the composition, diversity, and allergenic risk of street trees in Qingyang District of Chengdu City,

Urban Forestry & Urban Greening,

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126747,

ISSN 1618-8667,

https://doi.org/10.1016/j.ufug.2020.126747.

(https://www.sciencedirect.com/science/article/pii/S1618866720301564)

Abstract: The growing evidences suggest an association between street green space and health in cities. Pollen released by street trees has a considerable adverse impact on human health. This study aims to analyze the characteristics and assess the seasonally allergenic risk of street trees in Qingyang District, Chengdu City. There are 495 streets in Qingyang District, which have been divided into five categories according to their width. Fifty-seven species were identified, belonging to 46 taxa, and 28 botanical families in these streets. However, no significant differences in average diameter at breast height (DBH), tree height, and crown width of street trees were found among the five defined street categories. Both the street trees per capita (0.06) and the number of tree species are significantly higher than that in many Chinese cities. The Shannon's diversity index (SHDI) of street categories are clearly different, ranging from 0.94 to 3.84. Street category 5 (community street) has the highest tree density, area ratio, and SHDI of all street categories. In addition, Chengdu City is exposed to high allergenic risk of street trees. The index of urban green zone allergenicity (IUGZA) ranged from a minimum of 0.1002 for category 1 (urban expressway) to a maximum of 1.0391 for category 5, which indicates that the IUGZA value of different urban green spaces can exceed the upper limit (1.00). A increasing trend of the

IUGZA values is observed with decreasing street width. The highest allergic risk of street trees is observed in spring, followed by summer. Ginkgo biloba shows a highly contribute to the IUGZA value for all street categories. Pearson's correlation analysis identified area ratio and tree density, as crucial factors that affect the IUGZA. No correlation was observed between IUGZA scores and species richness (i.e., SHDI and the total number of species). A series of greening strategies have been proposed to minimize the volume of allergen production for the well-being of inhabitants in Chengdu City.

Keywords: Allergenic risk; Diversity; Pollen; Urban street trees

Hezekiah Oluwole ADEYEMI, Adekunle Olorunlowo DAVID, Olasunkanmi Oriola AKINYEMI, Omobolaji Taofeek OPAFOLA, Ayoola Abiola BABALOLA,

Sand shovelling and related injuries among sand mine workers in Nigeria,

Scientific African,

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https://doi.org/10.1016/j.sciaf.2020.e00313.

(https://www.sciencedirect.com/science/article/pii/S246822762030051X)

Abstract: This study evaluated work-related injuries among workers manually shovelling sand in Nigeria sand mines locations. The goal was to identify the type, prevalence, and risk factors of injuries. A non-probabilistic sampling technique was used to select 215 workers. Scooping rate, scooping length, shovel weight, throw height, throwing distance, break time among others, were measured and compared with the literature standards. .A modified version of Nordic

Questionnaire was used to measure job-related discomforts. The Intensity of shovelling-related injuries was assessed using Numeric Pain Rating Scale (NPRS). SPSS was used for statistical analysis of data. More than 72% of all task variables deviated from the recommended. The measured shovel handles average height (0.98 ± 0.18 m) was shorter than the users' average chest height (1.21 ± 0.14 m). The sand shovelling task was characterised with lengthy scoping period without break, high speed throwing motion, awkward lifting and use of inappropriate shovels. Shoulder and Low Back Pains (LBP) are the commonest injuries forming 43% of the total reported pains. Pain prevalence decreased with increased age. The study noted the absence of information on, the significance of the right use of shovel and, proper shovelling techniques. The authors, however, recommended the need for the relevant ergonomics training, redesign shovels for sand shovelling and the introduction of new technologies that will reduce manual handling of shovelling task in the developing world.

Keywords: Injury; Sand; Severity; Shovelling; Workers

Christopher Troeger, Brigette F Blacker, Ibrahim A Khalil, Puja C Rao, Shujin Cao, Stephanie RM Zimsen, Samuel B Albertson, Jeffery D Stanaway, Aniruddha Deshpande, Zegeye Abebe, Nelson Alvis-Guzman, Azmeraw T Amare, Solomon W Asgedom, Zelalem Alamrew Anteneh, Carl Abelardo T Antonio, Olatunde Aremu, Ephrem Tsegay Asfaw, Tesfay Mehari Atey, Suleman Atique, Euripide Frinel G Arthur Avokpaho, Ashish Awasthi, Henok Tadesse Ayele, Aleksandra Barac, Mauricio L Barreto, Quique Bassat, Saba Abraham Belay, Isabela M Bensenor, Zulfiqar A Bhutta, Ali Bijani, Hailemichael Bizuneh, Carlos A Castañeda-Orjuela, Abel Fekadu Dadi, Lalit Dandona, Rakhi Dandona, Huyen Phuc Do, Manisha Dubey, Eleonora Dubljanin, Dumessa Edessa, Aman Yesuf Endries, Babak Eshrati, Tamer Farag, Garumma Tolu Feyissa, Kyle J Foreman, Mohammad H Forouzanfar, Nancy Fullman, Peter W Gething,

Melkamu Dedefo Gishu, William W Godwin, Harish Chander Gugnani, Rahul Gupta, Gessessew Bugssa Hailu, Hamid Yimam Hassen, Desalegn Tsegaw Hibstu, Olayinka S Ilesanmi, Jost B Jonas, Amaha Kahsay, Gagandeep Kang, Amir Kasaeian, Yousef Saleh Khader, Ibrahim A Khalil, Ejaz Ahmad Khan, Muhammad Ali Khan, Young-Ho Khang, Niranjan Kissoon, Sonali Kochhar, Karen L Kotloff, Ai Koyanagi, G Anil Kumar, Hassan Magdy Abd El Razek, Reza Malekzadeh, Deborah Carvalho Malta, Suresh Mehata, Walter Mendoza, Desalegn Tadese Mengistu, Bereket Gebremichael Menota, Haftay Berhane Mezgebe, Fitsum Weldegebreal Mlashu, Srinivas Murthy, Gurudatta A Naik, Cuong Tat Nguyen, Trang Huyen Nguyen, Dina Nur Anggraini Ningrum, Felix Akpojene Ogbo, Andrew Toyin Olagunju, Deepak Paudel, James A Platts-Mills, Mostafa Qorbani, Anwar Rafay, Rajesh Kumar Rai, Saleem M Rana, Chhabi Lal Ranabhat, Davide Rasella, Sarah E Ray, Cesar Reis, Andre MN Renzaho, Mohammad Sadegh Rezai, George Mugambage Ruhago, Saeid Safiri, Joshua A Salomon, Juan Ramon Sanabria, Benn Sartorius, Monika Sawhney, Sadaf G Sepanlou, Mika Shigematsu, Mekonnen Sisay, Ranjani Somayaji, Chandrashekhar T Sreeramareddy, Bryan L Sykes, Getachew Redae Taffere, Roman Topor-Madry, Bach Xuan Tran, Kald Beshir Tuem, Kingsley Nnanna Ukwaja, Stein Emil Vollset, Judd L Walson, Marcia R Weaver, Kidu Gidey Weldegwergs, Andrea Werdecker, Abdulhalik Workicho, Muluken Yenesew, Biruck Desalegn Yirsaw, Naohiro Yonemoto, Maysaa El Sayed Zaki, Theo Vos, Stephen S Lim, Mohsen Naghavi, Christopher JL Murray, Ali H Mokdad, Simon I Hay, Robert C Reiner,

Estimates of the global, regional, and national morbidity, mortality, and aetiologies of diarrhoea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016,

The Lancet Infectious Diseases,

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2018,

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ISSN 1473-3099,

https://doi.org/10.1016/S1473-3099(18)30362-1.

(https://www.sciencedirect.com/science/article/pii/S1473309918303621)

Abstract: Summary

Background

The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2016 provides an up-to-date analysis of the burden of diarrhoea in 195 countries. This study assesses cases, deaths, and aetiologies in 1990–2016 and assesses how the burden of diarrhoea has changed in people of all ages.

Methods

We modelled diarrhoea mortality with a Bayesian hierarchical modelling platform that evaluates a wide range of covariates and model types on the basis of vital registration and verbal autopsy data. We modelled diarrhoea incidence with a compartmental meta-regression tool that enforces an association between incidence and prevalence, and relies on scientific literature, population representative surveys, and health-care data. Diarrhoea deaths and episodes were attributed to 13 pathogens by use of a counterfactual population attributable fraction approach. Diarrhoea risk factors are also based on counterfactual estimates of risk exposure and the association between the risk and diarrhoea. Each modelled estimate accounted for uncertainty.

Findings

In 2016, diarrhoea was the eighth leading cause of death among all ages (1 655 944 deaths, 95% uncertainty interval [UI] 1 244 073–2 366 552) and the fifth leading cause of death among children younger than 5 years (446 000 deaths, 390 894–504 613). Rotavirus was the leading aetiology for diarrhoea mortality among children younger than 5 years (128 515 deaths, 105 138–

155 133) and among all ages (228 047 deaths, 183 526–292 737). Childhood wasting (low weight-for-height score), unsafe water, and unsafe sanitation were the leading risk factors for diarrhoea, responsible for 80·4% (95% UI 68·2–85·0), 72·1% (34·0–91·4), and 56·4% (49·3–62·7) of diarrhoea deaths in children younger than 5 years, respectively. Prevention of wasting in 1762 children (95% UI 1521–2170) could avert one death from diarrhoea.

Interpretation

Substantial progress has been made globally in reducing the burden of diarrhoeal diseases, driven by decreases in several primary risk factors. However, this reduction has not been equal across locations, and burden among adults older than 70 years requires attention.

Funding

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M. Lukacs, L.G. Williams,

A sensitivity analysis of the factors that influence the hazard potential of fusion power plants,

Fusion Engineering and Design,

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(https://www.sciencedirect.com/science/article/pii/S0920379620307316)

Abstract: A robust safety case for a fusion power plant for electricity generation must demonstrate that the radiological risk to workers and the public under any credible accident scenario is as low as reasonably practicable (ALARP). Whilst the hazard potential of a fusion

power plant is significantly less than that of a fission power plant, a fusion power plant will still contain radiological inventories. From the work done in previous fusion safety studies and the current work being undertaken for the ITER project, it has been established that there are certain accident scenarios in which a part of these radiological inventories can be released into the atmosphere, potentially posing a risk to workers and members of the public. The actual radiological risk to an exposed person depends on a multitude of factors including type of inventory released, quantity released, height of release, weather conditions and age of person exposed, amongst others. The aim of this paper is to assess the radiological dose received by an exposed population under a variety of conditions, to put these releases into context by comparing them with sheltering and evacuation emergency reference levels (ERLs) and to discuss the impact of siting a fusion power plant near local populations.

Keywords: Fusion; Plant; Safety; Hazard; Risk; Regulation

Nuno D. Cortiços, Carlos C. Duarte,

Energy efficiency in large office buildings post-COVID-19 in Europe's top five economies,

Energy for Sustainable Development,

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https://doi.org/10.1016/j.esd.2022.04.006.

(https://www.sciencedirect.com/science/article/pii/S0973082622000539)

Abstract: Since the World Health Organization announced the COVID-19 pandemic, indoor airflows became a synonym for virus super-spreaders and the focus point for the scientific

community and professional associations across the globe, disrupting all daily life dimensions. Europe's quick response to control the disease led the REHVA board to address mitigation guidelines, reassessed by each member association's following national specifics. The present study aims to quantify the energy consumption and CO2 emissions of “large office” buildings in top-five European economies under the COVID-19 guidelines under the post-pandemic telework forecast. Methodology resorted to a standard model under Building Energy Simulation assessment to compare prior and posterior scenarios. The latter displays a tendency to increase energy and CO2 emissions in all locations, in the first form 10.18% (Rome) to 69.48% (Paris); and second 5.80% (Rome) and 120.61% (Paris), which will affect national energy production and imports, urban pollution and business competitiveness. On a different scope, future HVAC guidelines need to address the incoming figures, particularly in highly dense urban areas. Also, to comply with the goals set by the Paris Accord.

Keywords: Covid-19; Guidelines; Europe; Office buildings; RHEVA; Energy efficiency; Energy consumption; CO2 emissions

Ryoko Kawakami, Susumu S. Sawada, Kiminori Kato, Yuko Gando, Haruki Momma, Hideaki Oike, Motohiko Miyachi, I-Min Lee, Steven N. Blair, Minoru Tashiro, Chika Horikawa, Yasuhiro Matsubayashi, Takaho Yamada, Kazuya Fujihara, Hirohito Sone,
A Prospective Cohort Study of Muscular and Performance Fitness and Risk of Hearing Loss: The Niigata Wellness Study,
The American Journal of Medicine,
Volume 134, Issue 2,
2021,
Pages 235-242.e4,

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https://doi.org/10.1016/j.amjmed.2020.06.021.

(https://www.sciencedirect.com/science/article/pii/S0002934320306045)

Abstract: Background

Several cross-sectional studies have linked higher physical fitness with better hearing sensitivity but have not established a causal relation; none have used a prospective design that is less susceptible to bias. We used a prospective cohort study to investigate the association between muscular and performance fitness and the incidence of hearing loss.

Methods

A total of 21,907 participants without hearing loss received physical fitness assessments between April 2001 and March 2002. Muscular and performance fitness index, an age- and sex-specific summed z-score based on grip strength, vertical jump height, single-leg balance, forward bending, and whole-body reaction time was calculated. Participants were classified into quartiles according to the muscular and performance fitness index and each physical fitness test. They were followed up for the development of hearing loss, assessed by pure-tone audiometry at annual health examinations between April 2002 and March 2008. Hazard ratios and 95% confidence intervals for hearing loss incidence were estimated using Cox proportional hazards regression models.

Results

During follow-up, 2765 participants developed hearing loss. The hazard ratios (95% confidence intervals) for developing hearing loss across the muscular and performance fitness index quartiles (lowest to highest) were 1.00 (reference), 0.88 (0.79-0.97), 0.83 (0.75-0.93), and 0.79 (0.71-0.88) (Ptrend <.001). Among the various physical fitness components, a clear dose-response

association with hearing loss incidence was observed for vertical jump height and single-leg balance (Ptrend <.001 for both).

Conclusion

Higher muscular and performance fitness is associated with a lower incidence of hearing loss.

Keywords: Cohort studies; Ear diseases; Epidemiology; Exercise test; Physical fitness

Jie Li, Jing Huang, Ru Cao, Peng Yin, Lijun Wang, Yang Liu, Xiaochuan Pan, Guoxing Li, Maigeng Zhou,

The association between ozone and years of life lost from stroke, 2013–2017: A retrospective regression analysis in 48 major Chinese cities,

Journal of Hazardous Materials,

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124220,

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(https://www.sciencedirect.com/science/article/pii/S030438942032210X)

Abstract: The adverse impact of ozone on public health has attracted worldwide attention. However, few studies have addressed the contribution of ozone to disease burden caused by cardiovascular diseases. This study aimed to examine the association between short-term ozone exposure and years of life lost (YLL) from stroke in 48 Chinese cities. City-specific relative change of YLL was estimated by a generalized additive model, then pooled using random-effects meta-analysis. The potential effect modification of individual, climatic, and city-level characteristics was also evaluated. A 10 μg/m3 increase in three-day moving average of ozone

concentration was associated with 0.54% (95% CI: 0.41%, 0.66%), 0.25% (95% CI: 0.10%, 0.40%), and 0.70% (95% CI: 0.48%, 0.92%) relative increment in YLL from stroke, haemorrhagic stroke, and ischaemic stroke, respectively. The association magnitudes were larger in elderly people, females, or higher quartile groups of temperature (all $p < 0.01$). The potential avoidable life lost due to YLL from stroke was 5.5 days per deceased person if ozone concentration could reduce to the standard recommended by the World Health Organization (100 μg/m3). Our findings provided robust evidence on the impact of short-term ozone exposure on YLL from stroke and called for more stringent regulation of ozone.

Keywords: Ozone; Stroke; Years of life lost; Modification; Potential avoidable life lost

Fei Li, Jingjing Yan, Yongchang Wei, Jingjing Zeng, Xiaoying Wang, Xiyao Chen, Chuanrong Zhang, Weidong Li, Min Chen, Guonian Lü,

PM2.5-bound heavy metals from the major cities in China: Spatiotemporal distribution, fuzzy exposure assessment and health risk management,

Journal of Cleaner Production,

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124967,

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(https://www.sciencedirect.com/science/article/pii/S0959652620350113)

Abstract: In facing the challenge of PM2.5 pollution across China, an overall macro-evaluation of the spatiotemporal pollution distribution and health risk of PM2.5-bound heavy metals at a national level is urgently needed. This study involved a bibliometric analysis of 8 PM2.5-bound

heavy metals (Cd, Cr, Hg, As, Pb, Cu, Zn, Ni) in the 27 major cities across China from 2013 to 2019 that was combined with valid data from the published scientific literature. Based on time weight vector, the spatiotemporal metal distributions and their integrated enrichment factors were analyzed, and then a fuzzy health risk assessment model was established to synthetically screen regional priority control regions/pollutants, and explore the pollution trend. The integrated concentrations of As (19.44 ng/m3) and Cd (4.12 ng/m3) in most cities exceeded the limits of the Chinese Ambient Air Quality Standards, while Hg (0.81 ng/m3) and Pb (137.10 ng/m3) did not. Spatially, PM2.5-bound heavy metal pollution generally increased from southern to northern China, with North and Northwest of China being relatively hot regions. For integrated health risks, children (3.31) faced higher non-carcinogenic risks than adults (1.69), with As, Cd, and Cr as the main contributors. The total carcinogenic risk varied from $4.86 \times 10{-}6$ to $1.3 \times 10{-}3$. The total carcinogenic risk of 77.78% of major cities has reached Grade V (moderate-high risk) or above, and the risk contributions of Cr and As accounted for the largest proportion. The temporal variations showed that the pollution had a recent declining trend in most cities. Finally, 10 major cities and their corresponding metals were determined as the priority control cities/metals. The targeted risk management policies were developed for the identified hierarchical hot cities and their priority pollutants to control were based on the regional pollution trend and source characteristics.

Keywords: Toxic metals; PM2.5; Bibliometric analysis; Triangular fuzzy numbers; Health risk management

Mehrnoosh Abtahi, Sina Dobaradaran, Marzieh Torabbeigi, Sahand Jorfi, Reza Gholamnia, Ali Koolivand, Hossein Darabi, Amir Kavousi, Reza Saeedi,

Health risk of phthalates in water environment: Occurrence in water resources, bottled water, and tap water, and burden of disease from exposure through drinking water in tehran, Iran,
Environmental Research,
Volume 173,
2019,
Pages 469-479,
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https://doi.org/10.1016/j.envres.2019.03.071.
(https://www.sciencedirect.com/science/article/pii/S0013935119302051)

Abstract: Occurrence of phthalates in water resources, bottled water, and tap water, and health risk of exposure to the phthalates through drinking water in Tehran, Iran, 2018 were studied. The six phthalates with the most health and environmental concerns, including di-(2-ethylhexyl) phthalate (DEHP), butyl benzyl phthalate (BBP), di-n-butyl phthalate (DBP), diethyl phthalate (DEP), dimethyl phthalate (DMP), and di-n-octyl phthalate (DNOP) were monitored in drinking water and water resources. The average levels (±standard deviation: SD) of the total phthalates in drinking water from the water distribution system, bottled water, surface waters, and ground waters were determined to be 0.76 ± 0.19, 0.96 ± 0.10, 1.06 ± 0.23, and 0.77 ± 0.06 μg/L, respectively. The dominant compounds in the phthalates were DMP and DEHP causing a contribution to the total phthalate levels higher than 60% in all the water sources. The phthalate levels of drinking water significantly increased by contact of hot water with disposable plastic and paper cups and by sunlight exposure of bottled water (p value < 0.05). The hazard quotients (HQs) of DEHP, BBP, DBP, and DEP for all ages both sexes combined were determined to be $1.56 \times 10{-}4$, $1.01 \times 10{-}5$, $1.80 \times 10{-}5$, and $1.29 \times 10{-}6$, respectively that were much lower than the boundary value of 1.0. The disability-adjusted life years (DALYs) and DALY rate (per

100,000 people) attributable to DEHP intake through drinking water for all ages both sexes combined were estimated to be 6.385 (uncertainty interval: UI 95% 1.892 to 22.133), and 0.073 (0.022–0.255), respectively. The proportion of mortality in the attributable DALYs was over 96%. The attributable DALY rate exhibited no significant difference by sex, but was considerably affected by age in a manner that the DALY rates ranged from 0.052 (0.015–0.175) in the age group 65 y plus to 0.099 (0.026–0.304) in the age group 5 to 9 y. Both the carcinogenic and non-carcinogenic health risks of the phthalates in drinking water were considered to be very low. The results can also be of importance in terms of developing frameworks to expand the domain of burden of disease study to the other environmental risks.

Keywords: Disability-adjusted life year; Emerging pollutants; Endocrine disturbers; Exposure assessment; Water quality

Kritika Singh, J Maiti,

A novel data mining approach for analysis of accident paths and performance assessment of risk control systems,

Reliability Engineering & System Safety,

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107041,

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Abstract: The data mining researches to facilitate the process of safety management is fairly new, compared to other industrial management domains. The implementation of appropriate, effective,

and safe risk control systems (RCSs) is vital to ensure zero-accident and zero-harm vision of industrial work-systems. In this work, we propose a data mining based tool to analyze accident paths from incident data and assess the performance of RCSs. Our work upgrades the existing pattern analysis methods through three new types of analyses (i) temporal frequent itemset generation (T-FIG) for studying the time effect on patterns, (ii) elevated severity itemset generation (ESIG) for examining the risk reduction due to RCSs, and (iii) High impact itemset generation (High_impact_IG) to identify accident paths with high risk. T-FIG and ESIG assist in performance assessment of preventive and mitigating RCSs, respectively. The results from each of the analyses are compared and eight types of inferences regarding the performance of RCSs are drawn. The proposed methodology is applied to 612 incident records reported during steel making process in a steel manufacturing plant. It was found that there are four accident paths which have ineffective preventive and mitigating RCSs, have high risk and are probable to recur in future. Two among four of these paths include hot metal/steel/slag as the hazardous element and three of them are due to damaged/degraded/poorly maintained equipment. Moreover, the case study also demonstrates that proposed data mining approach is an effective and easy to use tool for performance assessment of RCSs and accident path analysis.

Keywords: Safety analytics & data mining; Frequent itemset generation; Temporal effect; Risk control system; Safety management

Sung Jin Bae, Sun Hwa Lee,

Computed tomographic measurements of the psoas muscle as a predictor of mortality in hip fracture patients: Muscle attenuation helps predict mortality in hip fracture patients,

Injury,

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Abstract: Introduction

In recent years, sarcopenia has been identified as an important risk factor of patient prognosis. The aim of this study was to determine the association between prognosis of hip fracture and sarcopenia and to evaluate the prognostic performance of psoas muscle volume and attenuation measurements in hip computed tomography (CT).

Material and methods

This was a retrospective cohort study of patients with hip fracture in our institution from 2014 to 2017. Baseline character data and hip CT scans were obtained. Two readers independently measured muscle size (cross-sectional area) and attenuation of the psoas muscle at the L4 vertebra on CT scans. Logistic regression analysis was used to identify the association between mortality and muscle index (the sum of the left and right muscle sizes divided by patient height) and muscle attenuation after adjusting for demographic variables. In addition, receiver operating characteristic (ROC) curves were obtained.

Results

In the 462 patients included in the study, in-hospital mortality was 4%. Multivariate logistic regression analysis revealed that muscle attenuation was a risk factor for mortality. Among baseline characteristics, age, sex, diastolic blood pressure, and albumin were significant variables for mortality. The area under the ROC curve (AUC) of muscle attenuation for prediction of death was 0.839 (0.803–0.872) with 84.2% sensitivity and 69.5% specificity. Furthermore, when we

combined all independent factors according to the results, the AUC was 0.929 (0.902–0.951) with 84.2% sensitivity and 93.6% specificity for prediction of mortality among hip fracture patients.

Conclusion

Among many variables, the most significant was muscle attenuation. CT is the most typical modality to determine treatment of hip fracture patients. Measuring muscle size and attenuation is simple using PACS software. Muscle attenuation has significant value for predicting the prognosis of hip patients.

Keywords: Psoas muscle; Sarcopenia; Hip fractures; Computed tomography; Mortality

Ruoyu Jin, Patrick X.W. Zou, Poorang Piroozfar, Hannah Wood, Yang Yang, Libo Yan, Yu Han, A science mapping approach based review of construction safety research,

Safety Science,

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2019,

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https://doi.org/10.1016/j.ssci.2018.12.006.

(https://www.sciencedirect.com/science/article/pii/S0925753518314371)

Abstract: This study adopted a three-step holistic review approach consisting of bibliometric review, scientometric analysis, and in-depth discussion to gain a deeper understanding of the research development in construction safety. Focusing on a total of 513 journal articles published in Scopus, the influential journals, keywords, scholars, and articles in the domain of construction safety were analyzed. For example, simulation and fall from height related topics, although not

with the highest occurrence of being studied, had the highest impact in terms of average citation received per year. It was found that research in the recent 10 years have been extended to the developing countries and regions with a more variety of research topics, such as BIM, and data mining, etc. Articles related to applying BIM in safety management received the highest average normalized citation. A follow-up qualitative discussion targeted three main objectives: summarizing mainstream research topics, identifying existing research gaps, and proposing future research directions. Five main categories were aligned, namely safety climate and safety culture, application of information technologies, worker-oriented safety, safety management program, and hazard recognition and risk assessment. Based on the above, a framework and future research directions were proposed which could serve both the academic community and practical fields in multiple themes within construction safety, including: an adaptable safety climate and safety culture model; prototypes, continuous development, and readiness of applying information technologies in safety management; subgroups factors linked to cognitive models of workers' safety perceptions and behaviors; and artificial intelligence and smart technologies into safety program management.

Keywords: Construction safety; Human factor; Scientometric review; Science mapping; Literature review

Martha Menchaca, Frank Pagone, Serap Erdal,

Comparison of positive SARS-CoV-2 incidence rate with environmental and socioeconomic factors in northern Illinois,

Heliyon,

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e07806,

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(https://www.sciencedirect.com/science/article/pii/S2405844021019095)

Abstract: Early studies showed positive associations fine particulate matter (PM2.5), course particulate matter PM10, nitrogen dioxide (NO2) and Ozone (O3) concentrations with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) confirmed cases in the United States. One study showed that a1 μg/m3 increase in PM2.5 is associated with an 8% increase in the COVID-19 death rate. Specifically, Chicago and surrounding suburbs have been labeled hot spots in the United States and correlation with air pollutants concentration will help identify specific communities most at risk. A number of studies have identified demographic variables associated with increased positive SARS-CoV-2 and the importance of air quality and socioeconomic factors must be further understood for more targeted public health responses. The results of this analysis noted positive relationships between zip code SARS-CoV-2 incidence rate and environmental and demographic EJ indicators. Evaluation of race and SARS-CoV-2 incidence rate at the zip code level found positive moderate correlations for ethnic minority individuals.

Keywords: Environmental pollution; PM2.5; SARS-CoV-2; Health; Socioeconomic

Joana S. Paiva, Pedro A.S. Jorge, Carla C. Rosa, João P.S. Cunha,

Optical fiber tips for biological applications: From light confinement, biosensing to bioparticles manipulation,

Biochimica et Biophysica Acta (BBA) - General Subjects,

Volume 1862, Issue 5,

2018,

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https://doi.org/10.1016/j.bbagen.2018.02.008.

(https://www.sciencedirect.com/science/article/pii/S0304416518300503)

Abstract: Background

The tip of an optical fiber has been considered an attractive platform in Biology. The simple cleaved end of an optical fiber can be machined, patterned and/or functionalized, acquiring unique properties enabling the exploitation of novel optical phenomena. Prompted by the constant need to measure and manipulate nanoparticles, the invention of the Scanning Near-field Optical Microscopy (SNOM) triggered the optimization and development of novel fiber tip microfabrication methods. In fact, the fiber tip was soon considered a key element in SNOM by confining light to sufficiently small extensions, challenging the diffraction limit. As result and in consequence of the newly proposed “Lab On Tip” concept, several geometries of fiber tips were applied in three main fields: imaging (in Microscopy/Spectroscopy), biosensors and micromanipulation (Optical Fiber Tweezers, OFTs). These are able to exert forces on microparticles, trap and manipulate them for relevant applications, as biomolecules mechanical study or protein aggregates unfolding.

Scope of review

This review presents an overview of the main achievements, most impactful studies and limitations of fiber tip-based configurations within the above three fields, along the past 10 years.

Major conclusions

OFTs could be in future a valuable tool for studying several cellular phenomena such as neurodegeneration caused by abnormal protein fibrils or manipulating organelles within cells.

This could contribute to understand the mechanisms of some diseases or biophenomena, as the axonal growth in neurons.

General significance

To the best of our knowledge, no other review article has so far provided such a broad view. Despite of the limitations, fiber tips have key roles in Biology/Medicine.

Keywords: Fiber optics; Optical fiber tips; Biology; Microfabrication; Optical fiber sensors; Optical fiber tweezers (OFTs)

Csaba Szabo,

A timeline of hydrogen sulfide (H2S) research: From environmental toxin to biological mediator,

Biochemical Pharmacology,

Volume 149,

2018,

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https://doi.org/10.1016/j.bcp.2017.09.010.

(https://www.sciencedirect.com/science/article/pii/S0006295217306068)

Abstract: The history of H2S – as an environmental toxin – dates back to 1700, to the observations of the Italian physician Bernardino Ramazzini, whose book “De Morbis Artificum Diatriba” described the painful eye irritation and inflammation of “sewer gas” in sewer workers. The gas has subsequently been identified as hydrogen sulfide (H2S), and opened three centuries of research into the biological roles of H2S. The current article highlights the key discoveries in the field of H2S research, including (a) the toxicological studies, which characterized H2S as an environmental toxin, and identified some of its modes of action, including the inhibition of

mitochondrial respiration; (b) work in the field of bacteriology, which, starting in the early 1900s, identified H2S as a bacterial product – with subsequently defined roles in the regulation of periodontal disease (oral bacterial flora), intestinal epithelial cell function (enteral bacterial flora) as well as in the regulation of bacterial resistance to antibiotics; and (c), work in diverse fields of mammalian biology, which, starting in the 1940s, identified H2S as an endogenous mammalian enzymatic product, the functions of which – among others, in the cardiovascular and nervous system – have become subjects of intensive investigation for the last decade. The current review not only enumerates the key discoveries related to H2S made over the last three centuries, but also compiles the most frequently cited papers in the field which have been published over the last decade and highlights some of the current 'hot topics' in the field of H2S biology.

Keywords: Gasotransmitters; Nitric oxide; Cystathionine-β-synthase; Cystathionine gamma lyase; 3-Mercaptopyruvate sulfurtransferase

Guoqi Yu, Yonghong Li, Jiansheng Cai, Dongmei Yu, Jiexia Tang, Wenwen Zhai, Yi Wei, Shiyi Chen, Quanhui Chen, Jian Qin,

Short-term effects of meteorological factors and air pollution on childhood hand-foot-mouth disease in Guilin, China,

Science of The Total Environment,

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Abstract: Background

Previous studies have always focused on the impact of various meteorological factors on Hand–foot–mouth disease (HFMD). However, only few studies have investigated the simultaneous effects of climate and air pollution on HFMD incidence.

Methods

Daily HFMD counts among children aged 0–14 years in Guilin city were collected from 2014 to 2016. Distributed lag nonlinear models (DLNM) were used to assess the effects of extreme meteorological factors and air pollution indicators, as well as the effects of different lag days on HFMD incidence. Furthermore, this study explored the variability across gender and age groups.

Results

Extreme temperatures, high precipitation and low-O3 concentration increased the risk of HFMD. Hot effect was stronger and longer lasting than cold effect. Risks of rainy effect and low-O3 effect continued to increase as lag days extended, with the maximum RR values: 1.60 (1.38, 1.86) (90th vs median) and 1.48 (1.16, 1.89) (1th vs median) at 0–14 lag days, respectively. By contrast, extremely high wind speed, low precipitation, low PM2.5 and high O3 exerted a certain protective effect on HFMD incidence. The corresponding minimum RR values were: 0.85 (0.74, 0.98) (90th vs median) at 0–14 lag days, 0.98 (0.97, 0.99) (10th vs median) at 0–14 lag days, 0.73 (0.61, 0.88) (1th vs median) at 0–14 lag days and 0.81 (0.73, 0.90) (99th vs median) at 0–7 lag days, respectively. Male children and children aged 0–1 years (followed by 1–3 years) were the most susceptible subgroups to extreme climatic effects and air pollution.

Conclusions

Our results indicated that daily meteorological factors and air pollution exert non-linear and delayed effects on pediatric HFMD, and such effects vary depending on gender and age. These

findings may serve as a reference for the development of an early warning system and for the adoption of specific interventions for vulnerable groups.

Keywords: Meteorological factor; Air pollution; Hand–foot–mouth disease; Children; Susceptible population

Syeda Hira Fatima, Paul Rothmore, Lynne C. Giles, Blesson M. Varghese, Peng Bi,
Extreme heat and occupational injuries in different climate zones: A systematic review and meta-analysis of epidemiological evidence,
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Abstract: Background

The link between heat exposure and adverse health outcomes in workers is well documented and a growing body of epidemiological evidence from various countries suggests that extreme heat may also contribute to increased risk of occupational injuries (OI). Previously, there have been no comparative reviews assessing the risk of OI due to extreme heat within a wide range of global climate zones. The present review therefore aims to summarise the existing epidemiological evidence on the impact of extreme heat (hot temperatures and heatwaves (HW)) on OI in different climate zones and to assess the individual risk factors associated with workers and workplace that contribute to heat-associated OI risks.

Methods

A systematic review of published peer-reviewed articles that assessed the effects of extreme heat on OI among non-military workers was undertaken using three databases (PubMed, Embase and Scopus) without temporal or geographical limits from database inception until July 2020. Extreme heat exposure was assessed in terms of hot temperatures and HW periods. For hot temperatures, the effect estimates were converted to relative risks (RR) associated with 1 °C increase in temperature above reference values, while for HW, effect estimates were RR comparing heatwave with non-heatwave periods. The patterns of heat associated OI risk were investigated in different climate zones (according to Köppen Geiger classification) based on the study locations and were estimated using random-effects meta-analysis models. Subgroup analyses according to workers' characteristics (e.g. gender, age group, experience), nature of work (e.g. physical demands, location of work i.e. indoor/outdoor) and workplace characteristics (e.g. industries, business size) were also conducted.

Results

A total of 24 studies published between 2005 and 2020 were included in the review. Among these, 22 studies met the eligibility criteria, representing almost 22 million OI across six countries (Australia, Canada, China, Italy, Spain, and USA) and were included in the meta-analysis. The pooled results suggested that the overall risk of OI increased by 1% (RR 1.010, 95% CI: 1.009–1.011) for 1 °C increase in temperature above reference values and 17.4% (RR 1.174, 95% CI: 1.057–1.291) during HW. Among different climate zones, the highest risk of OI during hot temperatures was identified in Humid Subtropical Climates (RR 1.017, 95% CI: 1.014–1.020) followed by Oceanic (RR 1.010, 95% CI: 1.008–1.012) and Hot Mediterranean Climates (RR 1.009, 95% CI: 1.008–1.011). Similarly, Oceanic (RR 1.218, 95% CI: 1.093–1.343) and Humid Subtropical Climates (RR 1.213, 95% CI: 0.995–1.431) had the highest risk of OI during HW

periods. No studies assessing the risk of OI in Tropical regions were found. The effects of hot temperatures on the risk of OI were acute with a lag effect of 1–2 days in all climate zones. Young workers (age < 35 years), male workers and workers in agriculture, forestry or fishing, construction and manufacturing industries were at high risk of OI during hot temperatures. Further young workers (age < 35 years), male workers and those working in electricity, gas and water and manufacturing industries were found to be at high risk of OI during HW.

Conclusions

This review strengthens the evidence on the risk of heat-associated OI in different climate zones. The risk of OI associated with extreme heat is not evenly distributed and is dependent on underlying climatic conditions, workers' attributes, the nature of work and workplace characteristics. The differences in the risk of OI across different climate zones and worker subgroups warrant further investigation along with the development of climate and work-specific intervention strategies.

Keywords: Occupation injuries; Hot temperatures; Heatwaves; Climate zones

İbrahim Eray Çakı, Beytullah Karadayı, Gürsel Çetin,

Relationship of injuries detected in fatal falls with sex, body mass index, and fall height: An autopsy study,

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(https://www.sciencedirect.com/science/article/pii/S1752928X20302201)

Abstract: Falls from height are the most common cause of blunt trauma after traffic accidents. The focus of this retrospective study was to analyze the relationship between injuries in fatal falls and fall height, body mass index (BMI), and sex in 206 autopsy reports. Age, sex, weight, height, place of the fall, fall height, period between the incidence and death, external examination findings in the autopsy, intracranial findings, fractures, internal organ injuries, and information about the causes of death were recorded. Accidents and men were the largest groups. Injuries to the upper and lower extremities were frequently detected in accidents. Lower extremity injuries were more common in women. The occurrence of head and neck injuries were rare in overweight individuals. When evaluated by manner of death, there were differences in extremities and posterior body injuries. There was no difference between sex in terms of autopsy findings. It was observed that the injuries increased as the height increased. There was a statistical difference between the BMI groups in terms of liver, rib and sternum injuries. The most common cause of death was head injuries. Many factors have been known to affect injury patterns in cases of falls from height. Fall height, BMI, and gender are just a few of these factors. This study will be beneficial to support the findings of this study with larger-scale studies and statistical modeling that consider more factors affecting injuries in cases of falls.

Keywords: Falls from height; Fatal falls; Injuries; BMI; Sex; Height

Carlos J. Toro-Huamanchumo, Miriam Pérez-Zavala, Diego Urrunaga-Pastor, Luciana De La Fuente-Carmelino, Vicente A. Benites-Zapata,

Relationship between the short stature and the prevalence of metabolic syndrome and insulin resistance markers in workers of a private educational institution in Peru,

Diabetes & Metabolic Syndrome: Clinical Research & Reviews,

Volume 14, Issue 5,

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(https://www.sciencedirect.com/science/article/pii/S1871402120302605)

Abstract: Background and aims

Short stature has been linked with the development of metabolic syndrome (MetS). However, only one study has been conducted in Latin American adults. We aimed to assess the association between short stature and MetS in workers of a private educational institution in Peru. In addition, we evaluated the association between height and surrogate markers of insulin resistance (IR).

Methods

We performed an analytical cross-sectional study. We categorized the height in tertiles and evaluated MetS according to the Latin American Diabetes Association statement. We used the triglycerides and glucose (TyG) index and the triglycerides to HDL-cholesterol (TG/HDL-c) ratio as IR markers. We elaborated crude and adjusted Poisson generalized linear models to evaluate the association between height tertiles and MetS. For the IR markers, we carried out crude and adjusted linear regressions.

Results

We analyzed 1080 participants and the overall prevalence of MetS was 16.2%. In the adjusted Poisson generalized linear model, using the high tertile as a reference, we found statistically significant differences in the prevalence of MetS with the low and intermediate tertile (aPR = 2.03; 95%CI: 1.48–2.77 and aPR = 1.41; 95%CI: 1.01–1.99; respectively). In the gender-

stratified analysis, we found statistical significance between height and MetS when comparing high and low tertile for both genders. For IR markers, we found an inverse association between the height and TyG index (aβ = −0.14; 95%CI: 0.19 to −0.10) and TG/HDL-c ratio (aβ = −0.62; 95%CI: 0.84 to −0.39). When we stratified by gender, the association for both secondary outcomes and height remained statistically significant in both groups.

Conclusions

We found an association between short stature and the prevalence of MetS and IR markers. We need studies with national representative samples to define the threshold of short stature with better sensitivity and specificity for the screening of MetS.

Keywords: Body height; Anthropometry; Metabolic syndrome; Insulin resistance; Latin America

Eleni Mantzari, Catherine Galloway, Katrien Wijndaele, Soren Brage, Simon J. Griffin, Theresa M. Marteau,

Impact of sit-stand desks at work on energy expenditure, sitting time and cardio-metabolic risk factors: Multiphase feasibility study with randomised controlled component,

Preventive Medicine Reports,

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https://doi.org/10.1016/j.pmedr.2018.11.012.

(https://www.sciencedirect.com/science/article/pii/S2211335518302729)

Abstract: Uncertainties remain about the overall effect of sit-stand desks for reducing prolonged sitting among office-based workers. This study assessed the feasibility of a randomised

controlled trial of the impact of workplace sit-stand desks on overall energy expenditure, sitting time and cardio-metabolic outcomes. It involved four phases: Phase I: online survey; Phase II: workspace auditing; Phase III: randomised intervention (provision of sit-stand desks at work for 3 months); Phase IV: qualitative component. Participants were office-based employees of two companies in Cambridge, England. Among Phase I participants interested in the trial, 100 were randomised to Phase II. Of those with workspaces suitable for sit-stand desks, 20 were randomised to Phase III. Those allocated to the intervention completed Phase IV. Outcomes included: trial participation interest, desk-type (full desks/desk mounts) and assessment location (work/laboratory/home) preferences (Phase I); proportion of workspaces permitting sit-stand desk installation (Phase II); energy expenditure, sitting time and cardio-metabolic outcomes (Phase III); study participation experiences (Phase IV). Data were collected between May 2015 and December 2016. Recruitment and trial implementation were feasible: 92% of survey respondents expressed participation interest; 80% of workspaces could accommodate sit-stand desks; assessments were done in workplaces, preferred by 71%. Sit-stand desk provision reduced workplace sitting time by 94 min/day (95% CI 17.7–170.7). Their impact on energy expenditure and cardio-metabolic outcomes is unclear. The results confirm the feasibility of a trial assessing sit-stand desks' impact on energy expenditure, sitting time and cardio-metabolic outcomes, which should reduce uncertainty concerning the intervention's potential to reduce the health risks of prolonged sitting. Trial registration ISRCTN44827407.

Keywords: Sit-stand desks; Standing desks; Height-adjustable desks; Sitting; Standing; Energy expenditure; Sedentary behaviour; Feasibility study

Jie Li, Xiao Zhang, Guoxing Li, Lijun Wang, Peng Yin, Maigeng Zhou,

Short-term effects of ambient nitrogen dioxide on years of life lost in 48 major Chinese cities, 2013–2017,

Chemosphere,

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(https://www.sciencedirect.com/science/article/pii/S0045653520320828)

Abstract: Background

Evidence on the acute effect of short-term exposure to nitrogen dioxide (NO2) on years of life lost (YLL) is rare, especially in multicity setting.

Methods

We conducted a time series study among 48 major Chinese cities covering more than 403 million people from 2013 to 2017. The relative percentage changes of NO2-YLL were estimated by generalized additive models in each city, then were pooled to generate average effects using random-effect models. In addition, stratified analyses by individual demographic factors and temperature as well as meta-regression analyses incorporating city-specific air pollutant concentrations, meteorological conditions, and socioeconomic indicators were performed to explore potential effect modification.

Results

A 10 μg/m3 increase in two-day moving average (lag01) NO2 concentration was associated with 0.64% (95% CI: 0.47%, 0.81%), 0.47% (95% CI: 0.27%, 0.68%), and 0.68% (95% CI: 0.34%, 1.02%) relative increments in YLL due to nonaccidental causes, cardiovascular diseases (CVD),

and respiratory diseases (RD), respectively. These associations were generally robust to the adjustment of co-pollutants, except for NO2-CVD that might be confounded by fine particulate matter. The increased YLL induced by NO2 were more pronounced in elderly people, hotter days, and cities characterized by less severe air pollution or higher temperature.

Conclusions

Our results demonstrated robust evidence on the associations between NO2 exposure and YLL due to nonaccidental causes, CVD, and RD, which provided novel evidence to better understand the disease burden related to NO2 pollution and to facilitate allocation of health resources targeting high-risk subpopulation.

Keywords: Nitrogen dioxide; Short-term; Years of life lost; Effect modification

Maurizio Ferri, Meredith Lloyd-Evans,

The contribution of veterinary public health to the management of the COVID-19 pandemic from a One Health perspective,

One Health,

Volume 12,

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100230,

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https://doi.org/10.1016/j.onehlt.2021.100230.

(https://www.sciencedirect.com/science/article/pii/S2352771421000203)

Abstract: The human coronavirus disease 2019 (COVID-19) pandemic represents one of the greatest public health crises in recent history, which has caused unprecedented and massive disruptions of social and economic life globally, and the biggest communication challenges for

public information-sharing. While there is strong evidence that bats are the animal source of SARS-CoV-2, the causative agent of COVID-19, there are many uncertainties around the epidemiology, the intermediate animal species, and potential animal routes of SARS-Cov-2 transmission to humans. While it has also long been known that coronaviruses circulate among different animal species, including SARS-CoV and MERS-CoV, responsible for the pandemics of severe acute respiratory syndrome and Middle East respiratory syndrome endemic in Middle Eastern countries in 2002–2003 and 2012 respectively, the way this pandemic is being managed tends to downplay or neglect the veterinary contribution, which is not in line with the One Health approach, if we consider that the genesis of the COVID-19 pandemic, likewise SARS and MERS lies on a close and interdependent links of humans, animals and the environment. To overcome this flaw, and to better operationalize the One Health approach, there are several lines of contributions the veterinary profession might provide to manage the COVID-19 pandemic in the framework of interventions jointly concerted in the veterinary and medical domains, notably: the experience in dealing with past animal epidemics, the skills in conducting wildlife surveillance targeting emerging pathogens at risky hot spots, and with the aim to predict and prevent future pandemics, the laboratory support for the diagnosis and molecular characterization of SARS-CoV-2 and human samples testing, and animal import risk assessment to define COVID-19 risk strategy for international air travel. The veterinary profession presents itself ontologically with a strong One Health accent and all the related valuable knowledge can be properly integrated within centralised multidisciplinary task-forces set up at the national and international level, with a renewed role in the management and monitoring structures required for managing the COVID-19 pandemic.

Keywords: Covid-19; SARS-CoV-2; Public health veterinarians; Epidemiological surveillance; One Health

Rodrigo W. Silva, Ricardo M. Stenders, Andre Luiz Q. Reis, José Carlos C. Amorim, Edson R. Andrade,

Potential urban threat after a radiological fire event,

Applied Radiation and Isotopes,

Volume 176,

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109905,

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(https://www.sciencedirect.com/science/article/pii/S0969804321003043)

Abstract: An accident involving both fire and radioactive material might eventually deteriorate into a dual-threat situation. Such scenario connects two important consequences: (a) fire damage and (b) radiation health threat. Computational simulations considering hypothetic fire scenarios in hospitals using radioactive material can provide valuable information about such an event. The initial decision in regards to an emergency response should consider the fire consequences and radiation doses distribution in the environment with consequences appearing at different times. While the fire presents an immediate threat, radiation exposure also creates immediate and future concerns. The purpose of this study is to evaluate leukemia risk from a hypothetical radiological fire event in a hospital operating Cs-137 gamma blood irradiator. The simulation in this study used the Hotspot Health Physics software to generate output data such as total effective dose (TED). The data from HotSpot was then used as an input to the leukemia risk equations from Biological Effects of Ionizing Radiation Committee V and VII (BEIR V and VII) models accordingly. Results suggest that the risks are dependent of wind speed and height of release;

however, when age and sex are taken into account different outputs are shown. Also, the risk model can be changed from BEIR VII (low doses) to BEIR V (high doses) as radiation doses rise due to its time-dependent behavior. Such change would bring potential impacts on logistics and risk communication.

Keywords: Fire; Radiation; Leukemia; Consequences

Chien-Cheng Jung, Ying-Fang Hsia, Nai-Yun Hsu, Yu-Chun Wang, Huey-Jen Su,
Cumulative effect of indoor temperature on cardiovascular disease–related emergency department visits among older adults in Taiwan,
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138958,
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https://doi.org/10.1016/j.scitotenv.2020.138958.
(https://www.sciencedirect.com/science/article/pii/S004896972032475X)

Abstract: Studies have demonstrated that exposure to extreme outdoor temperatures increases cardiovascular disease mortality and morbidity. However, people spend 80%–90% of their time indoors, and the cumulative effects of exposure to high or low temperature on the risk of cardiovascular diseases had not been considered. This study investigated the cumulative effects of high or low indoor temperature exposure on the risk of cardiovascular diseases. We estimated indoor temperatures by using a prediction model of indoor temperature from a previous study and further calculated the cumulative degree hours at different indoor temperature ranges. Samples of emergency department visits due to cardiovascular diseases were collected from the Longitudinal

Health Insurance Database (LHID) from 2000 to 2014 in Taiwan. We used a distributed lag nonlinear model to analyze the data. Our data demonstrated a significant risk of emergency department visits due to cardiovascular diseases at 27, 28, 29, 30, and 31 °C when cooling cumulative degree hours exceeded 62, 43, 16, 1, and 1 during the hot season (May to October), respectively, and at 19, 20, 21, 22, and 23 °C when heating cumulative degree hours exceeded 1, 1, 1, 11, and 33 during the cold season (November to April), respectively. Cumulative degree hours were different according to gender and age groups. Policymakers should further consider the cumulative effects to prevent hot- or cold-related cardiovascular diseases for populations.

Keywords: Indoor; Temperature; Cumulative degree hour; Cardiovascular; Emergency department visit

Hui Xu, Yi Liu, Chi-Min Shu, Mingqi Bai, Mailidan Motalifu, Zhongxu He, Shuncheng Wu, Penggang Zhou, Bing Li,

Cause analysis of hot work accidents based on text mining and deep learning,

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https://doi.org/10.1016/j.jlp.2022.104747.

(https://www.sciencedirect.com/science/article/pii/S0950423022000249)

Abstract: Hot work accidents have significant consequences. Admittedly, preventing hot work accidents requires managers to analyze the accident profoundly and learn from the requisite documents that contain the detailed process and causes of the accident. However, the analysis

process of unstructured records is manual, leading managers to failing to quickly analyze the cause of the accident and identify the key causes. Therefore, we used deep learning to automatically classify and predict the cause of accidents by the textual features and text mining methods that quickly extract the cause information to optimize accident record analysis. Initially, the latent Dirichlet allocation model was adopted to extract the topic words in the accidents to form cause topics, and convolutional neural networks were trained to predict the cause of the accident based on the previous cause topics. Then, the key causes of hot work accidents were extracted by qualifying the importance score of the cause, which included no gas detection and continuous monitoring, uncleaned combustibles, improper protection measures, and violations of regulations by workers. Managers can utilize these key causes to formulate optimal safety strategies to reduce the number of accidents. This study provides valuable suggestions for improving the process safety management of hot work in China. Moreover, the results of our method can be used as important documents for the safety education and training of the enterprise.

Keywords: Hot work; Key cause; Deep learning; Text mining; Process safety management

Gwendolyn Vuurberg, Lauren M. Wink, Inger N. Sierevelt, Sjoerd Jens, Robert Hemke, Maarten A. de Boer, Ellen den Butter, Gino M.M.J. Kerkhoffs, M. Maas,

Risk of chronic ankle instability: A reliability study on radiographic assessment of the ankle joint geometry,

The Foot,

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https://doi.org/10.1016/j.foot.2018.11.001.

(https://www.sciencedirect.com/science/article/pii/S0958259218300518)

Abstract: Background

Chronic ankle instability (CAI) is a multifactorial disabling condition. Ideally all factors contributing to CAI are identified and implemented in a risk assessment model. However, they need to meet strict reliability requirements. To assess usability of radiographic factors for this risk assessment model and future clinical practice, the objective of the current study was to assess the intra and inter observer reliability of three radiographic measurements.

Methods and methods

The radiographs of 39 consecutive patients, at least 16years, who visited the Emergency Department after sustaining a lateral ankle sprain (LAS), were assessed by four observers. The radiographic measurements included absolute and relative ankle alignment, sagittal fibular position and ankle joint congruency (talar radius and height, and tibiotalar sector), performed twice by all observers independently. Reliability was assessed by calculating the Intraclass Correlation Coefficient (ICC) which was considered good when ICC>0.70.

Results

The intra observer reliability of the absolute and relative fibular position, and talar height were good to excellent, (ICC 0.84–0.98, 0.85–0.98, and 0.79–0.93, respectively). The talar radius (ICC 0.69–0.89) was moderate to good. The overall inter observer reliability was good for the absolute and relative fibular position, and talar radius (ICC 0.84, 0.86, and 0.79, respectively). Other measurements had ICC values of <0.70.

Conclusions

In an effort to identify the multifactorial nature of CAI, both the fibular position and the talar radius measurements showed good observer reliability, and will be implemented in a future risk assessment models. The other measurements are too prone for measurement errors, for future reference.

Level of evidence

IV Case Series.

Keywords: Ankle instability; Joint geometry; Predisposing factors; Observer reliability; Conventional radiography

Min Zhou, Yanbin Xu, Pengqian Ouyang, Jiayin Ling, Qiujie Cai, Lu Huang, Xiao Zhou, Li Zheng,

Evolution and distribution of resistance genes and bacterial community in water and biofilm of a simulated fish-duck integrated pond with stress,

Chemosphere,

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https://doi.org/10.1016/j.chemosphere.2019.125549.

(https://www.sciencedirect.com/science/article/pii/S0045653519327894)

Abstract: Integrated fish-duck pond is a common circular farming model in South China, besides, it is also hot-spot for the co-selection of antibiotic resistance genes (ARGs). The aim of this study was to investigate the effects of duck manure, As and cefotaxime on the bacterial community, and the evolution and distribution of ARGs and metal(loid) resistance genes (MRGs) in water

and biofilm. Five groups of fish tanks included a control and four test groups. The experimental period lasted for 100 days. Six ARGs (CIT, DHA, EBC, FOX, MOX, TEM), two MRGs (arsB, arsC), and two integron genes (intI1, intI2) were tracked and detected in water and biofilm. The results showed that duck manure brought ARGs and MRGs into fish tanks. Stress factors (cefotaxime, As) increased the relative abundance of resistance genes, and this was positively correlated with stress concentrations. The biofilm was visible significantly at the end of stage 3, and the total relative abundance of resistance genes in biofilm was higher than water from stage 5 onwards. Evolution of AmpC β-lactamase resistance genes was more obvious than MRGs, especially for MOX, which increased by 3 orders of magnitude. The abundance of Flavobacterium was higher in biofilm than in water. Moreover, correlation analysis showed that both arsB and MOX were significantly correlated with intI1 ($p < 0.05$), which suggested a potentially dissemination risk of resistance genes. This study provides a reference for health risk assessment in integrated aquaculture environment contaminated with duck manure, antibiotics and metalloids.

Keywords: Fish-duck integrated pond; Duck manure; Stress factor; Resistance genes; Bacterial community

Giulio Vita, Zhenru Shu, Michael Jesson, Andrew Quinn, Hassan Hemida, Mark Sterling, Chris Baker,

On the assessment of pedestrian distress in urban winds,

Journal of Wind Engineering and Industrial Aerodynamics,

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104200,

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(https://www.sciencedirect.com/science/article/pii/S0167610520301100)

Abstract: Urban winds can cause a risk to pedestrian safety if not properly assessed. High-rise buildings produce a complex flow field at ground level, where regions of accelerated and recirculating flows are present. Gust wind speeds provide an indication of the maximal speed pedestrian might experience due to the unsteady flow. In this study, low- and high-fidelity numerical and experimental techniques to predict pedestrian level winds are tested on a realistic full-scale test-route at the University of Birmingham Campus during a storm event. Results show that it is beneficial to increase the complexity of simulations as a direct correspondence exists between the gust wind speed and the turbulent environment. While not much gain is achieved switching from Irwin Probes to hot-wire anemometry, LES greatly outperforms RANS and challenges experimental simulations in terms of reliability. The validity of the peak factor is also questioned and a general comment on the adequacy of each technique is discussed.

Keywords: Urban flow; Large eddy simulation; Wind tunnel; Pedestrian wind; Gustiness

Nancy M. Zaghloul, Haidy M. Megahed,

A descriptive medico-legal study of female deaths in cairo governorate, Egypt,

Journal of Forensic and Legal Medicine,

Volume 66,

2019,

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https://doi.org/10.1016/j.jflm.2019.05.018.

(https://www.sciencedirect.com/science/article/pii/S1752928X18302063)

Abstract: Background

Mortality is conditioned by biological, political and social factors, as well as by culturally defined behaviors and attitudes that historically characterize the stage of development of a country or a region. Women are often in great danger, where they should be safest. Violence against women is the most pervasive yet the least recognized human rights violation in the world. It is a profound health problem and femicide, is often the tragic end-point of violence. Females represent more than half of the Egyptian population, however, they remain vulnerable.

Aim of the study

To describe and analyze data obtained from Zeinhom Morgue records in Cairo, regarding female deaths, throughout two years. To evaluate female deaths regarding age, cause, manner of death, location, perpetrator and motive. To describe the incidence of female homicides and their related injury patterns. To identify the risk factors and nature of violence from victimologic point of view. Finally, to describe the manner of death whether natural, homicidal, suicidal or accidental aiming for early identification of vulnerable females so that actions can be taken to prevent further mortality.

Subjects and Methods

This is a national two year retrospective descriptive mortuary based study. The study population comprised of all adult females, aged 18 years and older, whose death was suspicious and medico-legal examination was ordered. Each investigation included a detailed case history, investigation, gross examination, histo-pathological and toxicological examinations. Data was collected from autopsy reports, hospital records and police records. From the available data the victim profile was made.

Results

All female deaths aged 18 years and older were retrospectively reviewed for 2 years at Zeinhom morgue of Medico-legal Authority from a total of 1858 autopsy cases. The most common manner of death was homicide. The commonest cause of death in homicides was due to sharp traumatic injuries. Natural death was the least common manner of death and ischemic heart disease constituted the commonest cause. Falling from height was the most common method of suicidal related deaths. Regarding poisoned cases, insecticides and carbon monoxide were the most common detected poisons. According to the cause of death (trauma), blunt trauma injuries were the most common. Falling from height constituted the largest percent of cases under this group.

Conclusion and recommendations

Females in the third decade of life with blunt injuries to the head and neck were the majority of adult female autopsies. Homicide was the most common manner of female death using sharp instruments after domestic arguments mainly by a spouse or relative. Accidental death came second mainly due to post-operative complications. In cases of suicide, falling from height was the commonest cause followed by poisoning. These findings could be useful for forensic pathologists and healthcare promoters in predicting and preventing female deaths. Moreover, this emphasizes the need for raising public awareness about the scale of female violence problem in our society. The results of this study indicates that, by not only a strong legal support network, but also by opportunities for economic independency, essential education and awareness, alternative accommodation and a change in attitude and mindset of society, judiciary, legislature, executive, men and most importantly women themselves can lower or even prevent such deaths specially suicidal.

Keywords: Female death; Homicide; Trauma; Violence; Egypt

Xinhong Li, Guoming Chen, Faisal Khan,

Analysis of underwater gas release and dispersion behavior to assess subsea safety risk,

Journal of Hazardous Materials,

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2019,

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ISSN 0304-3894,

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Abstract: Underwater gas release and dispersion characteristics are important to assess and manage potential risks. This paper presents an experimental and numerical investigation of underwater gas release and dispersion behavior. A small-scale experimental setup is designed and developed for underwater gas release and dispersion study. A series of release scenarios are carried out to study the effect of release size, leak pressure, and leak direction on dispersion behavior. The underwater gas dispersion behavior is analyzed from the risk assessment perspective. The considered parameters included plume offset, plume radius and fountain height for different scenarios. The experimental results are used to test and verify numerical computational fluid dynamics model using Eulerian-Lagrangian approach. The developed numerical model is subsequently used to analyze the gas plume in a full-scale scenario. The developed model would help to support risk assessment and response planning of potential subsea gas release accidents.

Keywords: Underwater gas release; Gas plume; Dispersion behavior; Numerical model; Experimental validation; Risk assessment

Wen Lun Yuan, Michael S. Kramer, Navin Michael, Suresh A. Sadananthan, Mya T. Tint, Ling-Wei Chen, Wei Wei Pang, Sendhil S. Velan, Keith M. Godfrey, Yap-Seng Chong, Mary F.F. Chong, Jonathan T.L. Choo, Lieng Hsi Ling, Johan G. Eriksson, Yung Seng Lee,
Trajectories of Systolic Blood Pressure in Children: Risk Factors and Cardiometabolic Correlates,
The Journal of Pediatrics,
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Abstract: Objective

To identify systolic blood pressure (SBP) percentile trajectories in children and to describe the early-life risk factors and cardiometabolic correlates of those trajectories.

Study design

Using age-, sex-, and height-specific SBP percentiles based on the American Academy of Pediatrics reference, we examined SBP trajectories using latent class mixed models from ages 3 to 8 years (n = 844) from the Growing Up in Singapore Towards healthy Outcomes-study, a Singaporean mother–offspring cohort study. We analyzed associations between SBP trajectories and early-life risk factors using multinomial logistic regression and differences across trajectories in cardiometabolic outcomes using multiple linear regression.

Results

Children were classified into 1 of 4 SBP percentile trajectories: “low increasing” (15%), “high stable” (47%), “high decreasing” (20%), and “low stable” (18%). Maternal hypertension during early pregnancy was a predictor of the “high stable” and “low increasing” SBP trajectories. Rapid child weight gain in the first 2 years of life was only associated with the “high stable” trajectory. Compared with children in the “low stable” trajectory, children in the “high stable” SBP trajectory had greater body mass index z scores, sum of skinfold thicknesses, waist circumference from ages 3 to 8 years, and abdominal adipose tissue (milliliters) at 4.5 years (adjusted mean difference [95% CI]: superficial and deep subcutaneous abdominal adipose tissue: 115.2 [48.1-182.3] and 85.5 [35.2-135.8]). Their fat mass (kilograms) (1.3 [0.6-2.0]), triglyceride levels (mmol/L) (0.10 [0.02-0.18]), and homeostasis model assessment of insulin resistance (0.28 [0.11 0.46]) at age 6 years were also greater but not their arterial thickness and stiffness.

Conclusions

Reducing maternal blood pressure during pregnancy and infant weight gain in the first 2 years of life might help to prevent the development of high SBP.

Keywords: latent class mixed model; adiposity; maternal hypertension; rapid weight gain; GUSTO

Brian H.W. Guo, Yang Miang Goh, Karen Le Xin Wong,

A system dynamics view of a behavior-based safety program in the construction industry,

Safety Science,

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Abstract: Behavior-based safety (BBS) has received significant attention in the construction industry during the past decades. Ample evidence suggests that BBS is an effective accident prevention strategy. Past BBS literature is dominated by successful case studies, while unsuccessful cases and cases with mixed effectiveness in reducing unsafe behavior are limited. This paper reports a BBS program designed and implemented in the Singapore construction industry. The BBS program was aimed at reducing unsafe behavior in nine categories: lifting operations, excavation, working at height, work platform & access, manual handling, hot work (welding/gas cutting), plant & equipment, traffic management, and personal protective equipment (PPE). It consists of traditional BBS elements such as baseline observations, feedback, goal setting, and interventions. In contrast to other successful applications, the BBS program produced mixed results of safety behavior over 36 weeks. This paper adopts a system dynamics view to explain the mixed effectiveness. Causal loop diagrams were developed to capture behavior change mechanisms underpinned by reinforcement theory and goal setting theory, as well as dynamic effects of contextual and cognitive factors. It is concluded that the mixed effectiveness can be attributed to three main issues: dynamics of goal commitment, punishment, and monetary incentive. This paper adds to the body of knowledge of behavior safety program in terms of theoretical basis and implementation. By reviewing the BBS program holistically and reflecting upon the details of the case study, this paper offers lessons and reference for future design and implementation of BBS program in the construction industry.

Keywords: Behavior-based safety; Construction safety; Safety behavior; Behaviorism; Goal setting theory

Anila Bello, Yalong Xue, Rebecca Gore, Susan Woskie, Dhimiter Bello,

Exposures and urinary biomonitoring of aliphatic isocyanates in construction metal structure coating,

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Abstract: Background

Isocyanates are highly reactive chemicals used widely in metal structure coating applications in construction. Isocyanates are potent respiratory and skin sensitizers and a leading cause of occupational asthma. At present, there is no cure for isocyanate asthma and no biomarkers of early disease. Exposure reduction is considered the most effective preventive strategy. To date, limited data are available on isocyanate exposures and work practices in construction trades using isocyanates, including metal structure coatings.

Objectives

The primary objectives of this work were: i) to characterize isocyanate inhalation and dermal exposures among painters during metal structure coating tasks in construction; and ii) to assess the adequacy of existing work practices and exposure controls via urinary biomonitoring pre- and post-shift.

Methods

Exposures to aliphatic isocyanates based on 1,6-hexamethylene diisocyanate (1,6-HDI) and its higher oligomers (biuret, isocyanurate and uretdione) were measured among 30 workers performing painting of bridges and other metal structures in several construction sites in the Northeastern USA. Exposure assessment included simultaneous measurement of personal inhalation exposures (n = 20), dermal exposures (n = 22) and body burden via urinary biomonitoring pre- and post-shift (n = 53). Contextual information was collected about tasks, processes, materials, work practices, personal protective equipment (PPEs) and exposure controls, work histories, and environmental conditions.

Results

Breathing zone concentrations were the highest for biuret (median, 18.4 μg/m3), followed by 1,6-HDI monomer (median, 3.5 μg/m3), isocyanurate (median, 3.4 μg/m3) and uretdione (median, 1.7 μg/m3). The highest exposures, measured during painting inside an enclosed bridge on a hot summer day, were: 10,288 μg/m3 uretdione; 8,240 μg/m3 biuret; and 947 μg/m3 1,6-HDI. Twenty percent of samples were above the NIOSH ceiling exposure limit for 1,6- HDI (140 μg/m3) and 35% of samples were above the UK-HSE ceiling for total isocyanate group (70 μg NCO/m3). Isocyanate loading on the gloves was generally high, with a median of 129 μg biuret/pair and maximum of 60.8 mg biuret/pair. The most frequently used PPEs in the workplace were half-face organic vapor cartridge (OVC) respirators, disposable palmar dip-coated polymer gloves, and cotton coveralls. However, 32% of workers didn't wear any respirator, 47% wore standard clothing with short-sleeve shirts and 14% didn't wear any gloves while performing tasks involving isocyanates. Based on biomonitoring results, 58.4% of urine samples exceeded the biological monitoring guidance value (BMGV) of 1 μmol hexamethylene diamine (HDA)/mol creatinine. Post-shift geometric mean HDA normalized to specific gravity increased by 2.5-fold

compared to pre-shift (GM, 4.7 vs. 1.9 ng/mL; p value, < 0.001), and only 1.4-fold when normalized to creatinine.

Conclusions

Exposure and biomonitoring results, coupled with field observations, support the overall conclusions that (i) substantial inhalation and dermal exposures to aliphatic isocyanates occur during industrial coating applications in construction trades; that (ii) the current work practices and exposure controls are not adequately protective. High urinary creatinine values in the majority of workers, coupled with significant cross-shift increases and filed observations, point to the need for further investigations on possible combined effects of heat stress, dehydration, and nutritional deficiencies on kidney toxicity. Implementation of comprehensive exposure control programs and increased awareness are warranted in order to reduce isocyanate exposures and associated health risks among this cohort of construction workers.

Keywords: Aliphatic isocyanates; Urinary biomonitoring; 1,6-Hexamethylene diamine; Dermal exposure; Urinary creatinine; Bridge coating

Elaine Cloutman-Green, Vera L. Barbosa, Diego Jimenez, Daniel Wong, Helen Dunn, Brian Needham, Lena Ciric, John C. Hartley,

Controlling Legionella pneumophila in water systems at reduced hot water temperatures with copper and silver ionization,

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Abstract: Background

Hospital-acquired Legionnaires' disease is associated with the presence of Legionella pneumophila in hospital water systems. In the United Kingdom, the Department of Health recommends maintaining hot water temperatures >55°C and cold water temperatures <20°C at the point of delivery to prevent proliferation of L pneumophila in water systems. In this study, we evaluated the efficacy of copper and silver ionization to control L pneumophila at deliberately reduced hot water temperatures (43°C) within a newly installed water system in a new building linked to a large health care facility in the United Kingdom.

Methods

One thousand, five hundred ninety-eight water samples were collected between September 2011 and June 2017. Samples were tested using accredited methods for L pneumophila, copper and silver ion levels, and total viable counts. Energy consumption and water usage data were also collected to permit carbon emission calculations.

Results

The results of 1,598 routine samples from September 2011 to June 2017, and the recordings of temperatures at outlets in this facility, demonstrated effective (100%) L pneumophila control throughout the study period with an average hot water temperature of 42°C. The energy savings and reduction of carbon emissions were calculated to amount to 33% and 24%, respectively, compared to an equivalent temperature-controlled system. Water system management interventions were required to achieve consistently adequate levels of copper and silver across outlets.

Conclusions

This study demonstrated that it is possible to control L pneumophila independent of temperature when copper and silver ionization is introduced into a new building in conjunction with an appropriately managed water system.

Keywords: Health care; Environment; Infection prevention and control; Water management; Engineering control

S. Colak, A. Tekın Orha, M.D. Yener, T. Colak, B. Bamac, E. Colak,
Musculoskeletal system related complaint: Is there any effect of sports ergonomics and lack of core stabilization exercises?,
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Abstract: Summary

Aim

Musculoskeletal pains are often due to the ergonomics risk factors of the environment. Furthermore, as the routine sport training involving aerobic exercises provides a fit and adequate musculoskeletal structure, doesn’t affect the core stabilization muscles. Therefore, strengthless muscles and unstable lumbo-pelvik musculoskeletal system provoke pain in related anatomical region. In this context, we aimed to evaluate the statistical relationship between the ergonomic approach and lack of core stabilization exercises with musculoskeletal pains of athletes.

Material and methods

A total of 80 athletes participated in our work. Standardized ergonomic muscle and skeletal system pains questionnaires were applied to participants. Correlation tests were performed and statistically evaluated by comparing the parameters such as gender, age range, height, weight, and sports age period. Also 52,25% (n: 41) of athletes complain of lumbar pain. Core stabilization exercises were performed during six weeks. Initial VAS and final VAS were analyzed.

Results

In total, 88,75% (n=71) of participants had complaints of pain related to musculoskeletal system during the last week. Age, height, weight, and age of sport showed significant correlations with pain complaints seen in some body regions as topographically ($P<0.05$). Also, a significant decrease of pain was observed after six weeks. Ergonomic conditions, incorrect static posture and core stability may be influential factors in the formation of musculoskeletal system diseases. The ergonomic change needs to involve both sports methods and working environments. Also, including core stabilization exercise in routine training program may ensure a pain decrease and an increase in performance.

Résumé

Objectif

Les douleurs musculosquelettiques sont souvent dues aux facteurs de risque ergonomiques de l'environnement. De plus, l'entraînement sportif routine n'affecte pas les muscles de stabilisation. Ainsi, les muscles faibles rendent le système musculosquelettique instable et provoquent des douleurs. Dans ce contexte, nous avons cherché à évaluer la relation statistique entre l'approche ergonomique et le manque d'exercices de stabilisation en relation avec les douleurs musculosquelettiques des athlètes.

Matériel et méthodes

Un questionnaire normalisé sur les douleurs musculaires du système squelettique a été appliqué à 80 participants. Les tests de corrélation ont été effectués et évalués statistiquement en comparant les paramètres tels que le sexe, la tranche d'âge, la taille, le poids et la période d'âge sportive. De plus, 52,25 % (n=41) des athlètes se plaignent de douleurs lombaires. Des exercices de stabilisation de base ont été effectués pendant six semaines. L'EVA initial et l'EVA final ont été analysées.

Résultats

Au total, 88,75 % (n=71) des participants avaient des plaintes de douleur au cours de la dernière semaine. L'âge, la taille, le poids et l'âge du sport ont montré des corrélations significatives avec les plaintes de douleur observées dans certaines régions du corps topographiquement ($p<0,05$). En outre, une diminution significative de la douleur a été observée après six semaines. Le changement ergonomique doit impliquer non seulement l'environnement de travail mais aussi les méthodes sportives. De plus, l'inclusion d'un exercice de stabilisation dans le programme d'entraînement routine peut assurer une diminution de la douleur et une augmentation de la performance.

Keywords: Ergonomics; Core stabilization exercise; Sportsman health; Musculoskeletal system; Ergonomie; Exercice de stabilisation lombaire; Santé sportive; Système musculosquelettique

Byeonggil Lyu, Kwanghee Lee, Taejong Kim, Hyungtae Cho, Il Moon,
Damage reduction strategies against chemical accidents by using a mitigation barrier in Korean chemical risk management,
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Abstract: After the hydrogen–fluoride release accident in 2012, the Korean society realized the importance of chemical safety and many plans have been proposed to improve it. After the big chemical accident, the “Chemical Control Act” was newly established. The law of the “Chemical Control Act” is the most representative measure for chemical safety. According to the law that came into force in 2015, all chemical dealing companies must conduct an off-site consequence analysis of their chemicals and develop a plan for risk management. To reduce off-site consequences from the chemical plant, an innovative risk-management plan was suggested by the Korean industry. A decision was made to build a 30 m high mitigation barrier outside the plant area to protect the public when a chemical release accident occurs. The construction is now under process, and two representative accident scenarios are developed for its simulation to confirm the effect of mitigation barrier. Each scenario follows guidelines of the “Chemical Control Act,” and simulation results show that the barrier helps reduce chemical concentration in the public area. This plan is expected to improve the anxiety of residents near the plant and will be a good example of risk management in the industry.

Keywords: Chemical accident; Safety regulation; Risk management; Mitigation; Barrier; Safety law

Fengxue Wang, He Zhang, Lina Hou, Chao Yang, Yongjun Wen,

Advance of African swine fever virus in recent years,

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Abstract: African swine fever (ASF) is one of the most devastating hemorrhagic infectious diseases that affect pigs and wild suids due to the lack of a vaccine or an effective treatment. The large dsDNA genome of African swine fever virus (ASFV) contains up to 167 ORFs that are predicted to encode proteins. Since its introduction to China in 2018, this genome has aroused the enthusiasm of researchers throughout the world. Here, we review the research progress on ASFV in recent years. Given the importance of this disease, this review will highlight recent discoveries in basic virology, focusing mainly on epidemiology, virulence, pathogenic mechanisms, diagnosis, vaccine development, and treatment; this will help in understanding virus-host interactions and disease prevention regarding ASFV.

Keywords: ASFV; Advance; Prevention