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PRESENTAZIONE

L'idea di una rassegna degli articoli scientifici pubblicati dai ricercatori su riviste internazionali, peer-reviewed e indicizzate, nasce dalla necessità di dare visibilità a questo tipo di trasferimento dei risultati delle attività di ricerca anche al di fuori della comunità scientifica. Infatti, questa produzione, benché contribuisca significativamente al prestigio dell'Istituto, è difficilmente fruibile al di fuori di un ristretto gruppo di specialisti, in quanto gli argomenti sono molto tecnici, viene pubblicata in lingua inglese, e non sempre le riviste sono accessibili gratuitamente. Gli articoli vengono menzionati, solo con la citazione, nei consuntivi annuali dei piani di attività, che hanno però una ben diversa finalità e diffusione.
La raccolta dei lavori pubblicati nel quarto trimestre 2025 consta di 20 articoli nei quali almeno uno degli autori è un ricercatore Inail. La multidisciplinarietà che caratterizza le tematiche affrontate, il cui filo conduttore è sempre la salute e sicurezza del lavoro, rispecchia la natura dei dipartimenti scientifici.
L'indice degli articoli è presentato in ordine alfabetico e contiene i collegamenti ipertestuali alle schede riassuntive, che riportano il titolo, i nomi degli autori, l'abstract in inglese, un breve sunto in italiano che ne rende il contenuto fruibile ad un'ampia platea di lettori e il link al full text (nel caso di riviste open access) per consentire la lettura dell'articolo originale a chi sia interessato.

Tra gli articoli scientifici pubblicati sul presente numero si segnala *From exposure to risk prevention: an integrated, data driven approach to testing and assessing occupational hazards of inhaled nanomaterials*, che presenta un approccio innovativo per valutare i rischi dei nanomateriali inalati nei luoghi di lavoro. Attraverso una strategia a test progressivi (OH-IATA), vengono analizzati eventi chiave come deposizione, biopersistenza e tossicità. Applicato a grafene e ossido di grafene, il metodo dimostra elevata capacità predittiva e supporta la definizione di strategie di controllo mirate nei luoghi di lavoro. Integrato nel framework "NanoKey", l'approccio offre uno strumento concreto per coniugare salute e sicurezza, sostenibilità e innovazione responsabile.

Si segnala, inoltre, l'articolo *Inside the Seveso directive via a systems-theoretic model: a way forward for ruling industrial safety management*, che offre una lettura innovativa della Direttiva Seveso III, evidenziando come la gestione della sicurezza negli impianti che trattano sostanze pericolose richieda il governo di complesse interazioni tra autorità europee, enti nazionali e operatori industriali. Attraverso il modello STAMP, gli autori mappano queste relazioni in una *Safety Control Structure* che rende visibile la natura socio tecnica della prevenzione degli incidenti rilevanti. Il lavoro dimostra come l'approccio sistemico possa migliorare l'efficacia delle pratiche di sicurezza, migliorando l'efficacia delle prescrizioni normative e valorizzando la comprensione dei meccanismi di controllo e feedback.

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INDICE

18-YR CUMULATIVE INCIDENCE OF RESPIRATORY OUTCOMES IS RELATED TO EMPLOYMENT SECTORS IN A GENERAL POPULATION SAMPLE

Maio S, Sarno G, Angino A, Stanisci I, Tagliaferro S, Gariazzo C, Marchetti MR, Massari S, Biggeri A, Catelan D, Viegi G, Baldacci S.

SUMMARY

Job-related exposures play a significant, often disregarded, role in respiratory outcome development. Evaluating how this exposure impacts the incidence of respiratory illnesses in the general population is crucial for prevention and occupational health surveillance. A total of 823 workers/ex-workers from Pisa (Italy) participated in 2 surveys over 18 years (PI2 1991-93, PI3 2009-11). Health status, occupational sector, and individual risk factors were assessed through a questionnaire; airway obstruction (AO) by spirometry. Exposure was defined as working for at least 3 months in a sector at risk for respiratory diseases at PI2. Cumulative incidence was calculated as "incident cases/population at risk". The relationship between outcome incidence and occupational exposure was assessed through multiple logistic regressions adjusted for baseline (PI2) risk factors. Analysis of covariance estimated the effect of occupational exposure on changes in FEV1/FVC over time. Associations were found among occupational exposure and outcome incidence: agriculture for usual cough/phlegm (OR 2.16, 90% CI 1.17–3.99) and AO (3.06, 1.14–8.24); mining industry/quarries/excavation for attacks of shortness of breath with wheezing (SOBWHZ) (2.41, 1.16–5.02) and AO (2.95, 1.20–7.26); textile industry for asthma (2.61, 1.00–6.79), chronic obstructive pulmonary disease (COPD) (2.56, 1.35–4.85), SOBWHZ (3.09, 1.57–6.06) and wheezing (2.00, 1.00–3.97); wood industry for asthma (3.16, 1.21–8.26); mechanical industry for AO (2.34, 1.06–5.18). Agriculture and mining industry/quarries/excavation were also related to a greater decrease in the FEV1/FVC values. Longitudinal analyses confirm that employment in high-risk sectors, particularly the textile industry, is a significant determinant of respiratory disease incidence and lung function decline.

BREVE SINTESI

Le esposizioni professionali sono fondamentali, ma spesso ignorate, nello sviluppo delle malattie respiratorie. Uno studio su 823 lavoratori ed ex-lavoratori di Pisa ha valutato l'incidenza delle malattie respiratorie in relazione a vari settori professionali. Risultati evidenziano che l'agricoltura, l'industria mineraria, quella tessile e il settore meccanico sono associati a un aumento dell'incidenza di malattie respiratorie e al declino della funzione polmonare. L'esposizione professionale è un determinante importante.

CITAZIONE BIBLIOGRAFICA

Maio S, Sarno G, Angino A et al. 18-yr cumulative incidence of respiratory outcomes is related to employment sectors in a general population sample. Sci Rep. 2025;15(1):42887.

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ALGORITHMIC MANAGEMENT AND PSYCHOSOCIAL RISKS AT WORK: AN EMERGING OCCUPATIONAL SAFETY AND HEALTH CHALLENGE

Bowdler M, Lahti H, Jelenko M, Buresti G, Valtonen T.

SUMMARY

Algorithmic management (ALMA) systems are expanding from platform work into traditional sectors like logistics and healthcare, reshaping work organization through digital tools and AI. Drawing on a PEROSH network review of 39 empirical studies (2022–2024) across platform-based and traditional work settings, this editorial shows that ALMA shifts decision-making from managers to algorithms, often increasing job demands and reducing worker resources. In opaque, control-driven environments, reduced autonomy, limited support, and exploitation are common, with large-scale surveys confirming a strong link between ALMA intensity and OSH strain. Participatory practices can limit algorithmic control, and transparent algorithms enhance trust, motivation, and job satisfaction. ALMA often upsets the balance between job demands and resources, rising psychosocial risks and negative OSH outcomes. While worker participation and transparency can mitigate these effects, ongoing research, flexible regulation, and stakeholder cooperation are required. Key priorities include better OSH protection, long-term studies and improved measurement tools. The AMQ questionnaire offers a basis but requires refinement and distinctions between platform-based and traditional work settings to ensure OSH, privacy and non-discrimination.

ALMA shifts workplace power from workers to employers and platforms, often hiding psychosocial risks behind claims of neutrality and efficiency, highlighting the need for strong regulatory and organizational safeguards. The EU AI Act is a significant regulatory step, but it must be complemented by mandatory OSH risk assessments and organizational safeguards addressing psychosocial risks. Research should continue to inform regulation and workplace practice, ensuring privacy, equality, transparency, worker participation, and liability in ALMA systems, within a coordinated European framework involving social partners and human oversight.

BREVE SINTESI

I sistemi di gestione algoritmica (ALMA) stanno cambiando l'organizzazione del lavoro. La presente revisione, basata su 39 studi in contesti di lavoro tradizionali e su piattaforma, mostra come ALMA spesso altera l'equilibrio tra richieste di lavoro e risorse, aumentando rischi psicosociali ed esiti negativi su SSL. Partecipazione e trasparenza possono limitarne gli effetti ma servono studi ulteriori, strumenti di misura implementati e solide tutele normative, specie su SSL, privacy e responsabilità, in un quadro europeo coordinato.

CITAZIONE BIBLIOGRAFICA

Bowdler M, Lahti H, Jelenko M et al. Algorithmic management and psychosocial risks at work: an emerging occupational safety and health challenge. Scand J Work Environ Health. 2026;52(1):1-5.

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DIAGNOSTIC AND THERAPEUTIC MANAGEMENT OF MESOTHELIOMA OF THE TUNICA VAGINALIS TESTIS: A POPULATION-BASED STUDY IN ITALY

Ceresoli GL, Stella S, Dallari B, Perduri R, Storchi C, Vimercati L, Piro S, Giovannetti L, Fedeli U, Casotto V, Migliore E, Stura A, Genova C, Benfatto L, Larese Filon F, D'Agostin F, Cozzi I, Angelillo IF, Spata E, Murano S, Grappasonni I, Pascucci C, Melis M, Stracci F, Marinaccio A, Binazzi A, Consonni D, Mensi C.

SUMMARY

Background: Mesothelioma of the tunica vaginalis testis (MTVT) is an exceedingly rare tumor. We performed a registry-based study on MTVT patient management and survival in Italy. Methods: Cases were extracted from the dataset of the Italian National Mesothelioma Registry. A descriptive analysis of patient characteristics, including asbestos exposure, clinical presentation, diagnostic work-up and therapeutic management, was performed. Overall survival was evaluated. We calculated hazard ratios (HR) and 95% confidence intervals (CI) for selected variables by fitting univariate and multivariable Cox models. Results: Overall, 104 patients with MTVT were included. Median age was 72 years (range 17–92). Epithelioid histotype was the most frequent. Previous asbestos exposure was identified in two thirds of cases. Data on diagnostic and therapeutic management were available for 74 patients (71%). The most frequent presentations were scrotal swelling/mass, hydrocele and inguinal pain. All patients underwent surgery, mostly with orchi-funicolectomy. Adjuvant therapy was administered to 15 patients (20%). Overall median survival was 26.2 months (95% CI 22.1–52.1); 3-, 5- and 10-year survival was 49%, 30% and 18%. Older age at diagnosis and presence of distant metastasis (HR 1.91, CI: 0.85–4.26) were negative prognostic factors. Adjuvant therapy was associated with higher mortality (HR 2.54, CI: 1.25–5.15), indicating a more advanced stage at diagnosis. Conclusions: Surgery remains the mainstay of treatment for MTVT; adjuvant therapy in our study did not improve outcome. Data from cancer registries are essential for rare cancers, but they should be integrated routinely with additional diagnostic and therapeutic information.

BREVE SINTESI

Lo studio ha riguardato 104 pazienti con mesotelioma della tunica vaginale del testicolo e la loro sopravvivenza. L'esposizione ad amianto è stata identificata in due terzi dei casi. I dati su diagnosi e terapia erano disponibili per 74 pazienti. La terapia adiuvante è stata somministrata a 15 pazienti. La sopravvivenza mediana è 26,2 mesi. La terapia adiuvante è stata associata a una mortalità più elevata, indicando uno stadio più avanzato alla diagnosi.

CITAZIONE BIBLIOGRAFICA

Ceresoli GL, Stella S, Dallari B et al. Diagnostic and therapeutic management of mesothelioma of the tunica vaginalis testis: a population-based study in Italy. Cancers. 2025;17(19):3249.

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DISABILITY WORKER PROFILES: EXAMINING WORK-RELATED DIFFICULTIES, MOOD, AND COPING STRATEGIES IN WORKERS WITH MULTIPLE SCLEROSIS

Ponzio M, Grange E, Di Antonio F, Persechino B, Manacorda T, Cellerino M, Inglese M, Durando P, Battaglia MA, Brichetto G, Podda J.

SUMMARY

While remaining at and returning to work are clearly complex issues in multiple sclerosis (MS), in which many aspects (physical, psychological and relational, as well as personal resources such as coping strategies) can play a key role, there is still room for potential interventions. This study aimed to identify and describe profiles of workers with MS (wwMS), considering specific work-related domains, namely, work-related difficulties, anxiety and depressive symptoms, and coping strategies. A cross-sectional online survey of wwMS was conducted in Italy. Hierarchical cluster analysis was performed using the Ward method followed by k-means cluster analysis. In total, 209 workers with MS were included in the analysis. We identified four profiles: profile 1 had low work difficulties, low depressive symptoms and mild anxiety, with a moderate tendency to use 'problem focus' and 'positive attitude' and a mild tendency to use 'social support' as coping strategies (n = 82, 39.2%); profile 2 had low-to-mild work difficulties, mild anxiety and low depressive symptoms, with a high tendency to use 'positive attitude' and 'religion', moderate use of 'problem focus' and 'social support', and mild use of 'denial' (n = 38, 18.7%); profile 3 had low-to-mild work difficulties, moderate anxiety and depressive symptoms, with a mild tendency to use 'problem focus', 'positive attitude', 'religion', 'social support' and 'denial' as coping strategies (n = 50, 23.9%); profile 4 had mild-to-moderate work difficulties, moderate anxiety and depressive symptoms, with a moderate tendency to use 'problem focus' and 'positive attitude', and a mild tendency to use 'social support' and 'denial' as coping strategies (n = 39, 18.7%). Identifying profiles of workers with a chronic and progressive disability such as MS may lead to the development of personalised interventions.

BREVE SINTESI

Questo studio mirava a identificare e descrivere i profili dei lavoratori con SM (wwMS), considerando specifici ambiti legati al lavoro, ovvero difficoltà lavorative, ansia e sintomi depressivi e strategie di coping. È stata condotta un'indagine trasversale online sui wwMS in Italia ed eseguita un'analisi gerarchica dei cluster utilizzando il metodo Ward seguita da un'analisi dei cluster k-means. In totale, sono stati inclusi nell'analisi 209 lavoratori con SM. Sono stati identificati quattro profili. L'identificazione dei profili dei lavoratori con una disabilità cronica e progressiva come la SM può portare allo sviluppo di interventi personalizzati.

CITAZIONE BIBLIOGRAFICA

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DOI: https://doi.org/10.1057/s41599-025-05997-0

EXPLORING THE EFFECTIVENESS OF A HEAT-RELATED OCCUPATIONAL PREVENTION POLICY: A CASE STUDY FROM ITALY

Morabito M, Crisci A, Guerri G, Bonafede M, Marinaccio A.

SUMMARY

Background: In summer 2024, fifteen Italian regions issued urgent ordinances banning outdoor work from 12:30 to 4:00 p.m. on "HIGH" heat risk days forecasted by the academic Worklimate platform. Objective: This study explores the policy's effectiveness in reducing workplace injuries. Methods: ERA5-Land hourly data were used to assess regional summer temperature variations in Italy. Injury data from the National Insurance Institute focused on construction and agriculture, while workforce statistics enabled injury rate comparisons between regions with and without ordinances. Results were stratified by sector and Worklimate heat risk levels. Results: Regions with ordinances saw a statistically significant 21.9% reduction (95% CI: −18.5 - −24.7) in construction injury rates, and over 40% on "HIGH" risk days. Agriculture-related injuries decreased by 24.7% (95% CI: −10.3 - −32.2), though not statistically significant. Impact statement: This study provides the first European evidence that temporary work bans during periods of extreme heat can effectively reduce occupational injuries. By comparing Italian regions that implemented urgent ordinances prohibiting outdoor work on "HIGH" heat-risk days with those that did not, the analysis demonstrates that restricting outdoor activity during peak heat hours led to a significant reduction in construction-related injuries and a marked decline in agricultural accidents. These findings underscore the effectiveness of heat-prevention policies in safeguarding outdoor workers amid rising temperatures, offering a robust, evidence-based framework for future public health and occupational safety strategies.

BREVE SINTESI

Nell’estate 2024 quindici regioni italiane hanno introdotto ordinanze che vietavano il lavoro all’aperto nelle ore più calde nei giorni a rischio “ALTO” secondo Worklimate. Lo studio evidenzia una significativa riduzione degli infortuni in edilizia (-21,9%, oltre -40% nei giorni critici) e un calo in agricoltura (-24,7%). I risultati suggeriscono che misure temporanee contro il caldo possono contribuire a tutelare i lavoratori e orientare future strategie di prevenzione.

CITAZIONE BIBLIOGRAFICA

Morabito M, Crisci A, Guerri G et al. Exploring the effectiveness of a heat-related occupational prevention policy: a case study from Italy. J Expo Sci Environ Epidemiol. 2025.

DOI: https://doi.org/10.1038/s41370-025-00831-w

FROM EXPOSURE TO RISK PREVENTION: AN INTEGRATED, DATA DRIVEN APPROACH TO TESTING AND ASSESSING OCCUPATIONAL HAZARDS OF INHALED NANOMATERIALS

Di Cristo L, Balusamy B, Romaldini A, Tombolini F, Ferrante R, Cavallo D, Ursini CL, Leoncino L, Del Rio Castillo AE, Bonaccorso F, Iavicoli S, Boccuni F, Sabella S.

SUMMARY

Occupational risk assessment of manufactured nanomaterials (MNMs) requires targeted hazard and exposure quantification, which, however, are currently limited by uncertainties about measurements and metrics. Integrated approaches to testing and assessment (IATAs) emerge as efficient tools to streamline the risk assessment of MNMs. This study formulates an Occupational Hazard IATA (OH IATA) to identify and quantify the hazard of involuntarily inhaled MNMs in workplaces. Following general IATA guidance, key toxicity events (KTEs) relevant to inhaled MNMs, such as deposition, accumulation, local or systemic inflammation, and genotoxicity, were identified and incorporated into decision nodes (DNs) within the OH IATA framework. The OH IATA is structured as a decision tree enabling tiered testing strategies, from in vitro to in vivo, to generate evidence addressing the DNs. Hazard profiles are categorized into bands labelled from A (no risk) to E (serious hazard), following ISO control banding principles and including new criteria focusing on key physicochemical descriptors like deposition and dissolution in synthetic biological fluids. The OH IATA was evaluated using industrial case studies such as few-layer graphene (FLG) and graphene oxide (GO), applying a hybrid data-gathering approach that combines next-generation and literature-based data. The results demonstrated that OH IATA successfully assigned hazard.

BREVE SINTESI

La valutazione del rischio occupazionale dei nanomateriali ingegnerizzati (MNM) richiede una quantificazione mirata del pericolo e dell'esposizione, che tuttavia è attualmente limitata dalle incertezze relative a misurazioni e parametri di riferimento. Gli approcci integrati di test e valutazione (IATA) emergono come strumenti efficienti per semplificare la valutazione del rischio degli MNM. Questo studio formula un Occupational Hazard IATA (OH IATA) per identificare e quantificare il rischio degli MNM inalati involontariamente nei luoghi di lavoro. Seguendo le linee guida generali IATA, gli eventi di tossicità chiave (KTE) rilevanti per gli MNM inalati, come deposizione, accumulo, infiammazione locale o sistemica e genotossicità, sono stati identificati e incorporati nei nodi decisionali (DN) all'interno del framework OH IATA. L'OH IATA è strutturato come un albero decisionale che consente strategie di test a più livelli, da in-vitro a in-vivo, per generare evidenze che affrontino i DN. I profili di pericolosità sono classificati in fasce da A (nessun rischio) a E (rischio grave), seguendo i principi di controllo ISO e includendo nuovi criteri incentrati su descrittori fisico-chimici chiave come la deposizione e la dissoluzione nei fluidi biologici sintetici. L'OH IATA è stato valutato utilizzando casi di studio industriali come il few layered graphene (FLG) e il graphene oxide (GO), applicando un approccio ibrido di raccolta dati che combina dati di nuova generazione e dati basati sulla letteratura. I risultati hanno dimostrato che l'OH IATA ha assegnato con successo le bande di pericolo per i materiali considerati.

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FROM WEARABLE SENSOR NETWORKS TO MARKERLESS MOTION CAPTURE FOR INSTRUMENTAL-BASED BIOMECHANICAL RISK ASSESSMENT IN LIFTING ACTIVITIES

Gennarelli I, Varrecchia T, Chini G, Martinel N, Micheloni C, Ranavolo A.

SUMMARY

Manual material handling is one of the leading causes of work-related low-back disorders, and an accurate assessment of the biomechanical risk is essential to support prevention strategies. Despite interest in wearable sensor networks for quantifying exposure metrics, these systems still present several limitations, including potential interference with natural movements and workplaces, and concerns about durability and cost-effectiveness. For these reasons, alternative motion capture methods are being explored. Among them, completely markerless (ML) technologies are being increasingly applied in ergonomics. This study aimed to compare a wearable sensor network and an ML system in the evaluation of the biomechanical risk in lifting tasks. Twenty-eight workers performed standardized lifts under three risk conditions. The results showed significant differences between wearable sensor networks and ML systems for most measures, except at a low risk. Nevertheless, ML consistently showed a closer agreement with reference benchmarks and a lower variability. In terms of the automatic classification performance, ML–based kinematic variables yielded accuracy levels comparable to those obtained with the wearable system. These findings highlight the potential of ML approaches to deliver accurate, repeatable, and cost-effective biomechanical risk assessments, particularly in demanding lifting tasks.

BREVE SINTESI

Si stanno esplorando metodi alternativi di motion capture, tra cui le tecnologie completamente senza marker (ML) trovano sempre più applicazione nell'ergonomia. Questo studio mirava a confrontare una rete di sensori indossabili e un sistema ML nella valutazione delle attività di sollevamento, concentrandosi sulle variabili e sui moltiplicatori utilizzati per calcolare il peso raccomandato e l'indice di sollevamento dell'equazione di Niosh. Ventotto lavoratori hanno eseguito sollevamenti standardizzati in tre condizioni di rischio. Il ML ha mostrato costantemente una maggiore corrispondenza con i parametri di riferimento e una minore variabilità. In termini di prestazioni di classificazione automatica, le variabili basate sul ML hanno prodotto livelli di accuratezza paragonabili a quelli ottenuti con il sistema indossabile. Questi risultati evidenziano il potenziale degli approcci ML nel fornire valutazioni del rischio biomeccanico accurate, ripetibili ed economiche, in particolare nelle attività di sollevamento impegnative.

CITAZIONE BIBLIOGRAFICA

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HOSPITALIZATIONS AND SURGICAL MANAGEMENT OF LUMBAR DISC DEGENERATION IN ITALY: A 22-YEAR NATIONWIDE RETROSPECTIVE STUDY

Russo F, Rondinone BM, Papalia GF, Vadalà G, Papalia R, Denaro V, Iavicoli S.

SUMMARY

Background: Lumbar spine disorders significantly impact disability and healthcare worldwide, especially in aging populations. Over two decades, surgical approaches have evolved. Methods: This nationwide retrospective study analyzed hospitalizations for lumbar disc degeneration surgery in Italy (2001–2022) using the national hospital discharge database. Age- and sex-standardized hospitalization rates (SHRs) were calculated; Poisson regression assessed factors influencing length of stay; interregional mobility was examined. Results: A total of 621,948 patients (57.4% male; 42.9% aged 45–64) underwent surgery. SHRs declined from 57.41 to 49.43 per 100,000, peaking at 66.38 in 2004. Average hospital stay dropped from 6.4 to 3.0 days. Longer stays occurred in patients ≥75 years (IRR=1.070), in Southern regions (IRR=1.199) or Islands (IRR=1.165), and after fusion surgery (IRR=1.905). Private institutions were linked to shorter stays (IRR=0.743). Decompression peaked in 2004 (>32,000 cases) then declined; fusion increased steadily (>5,700 cases in 2022); arthroplasty remained rare (<60 cases/year). Most regions treated >80% of residents locally, though patient flows persisted. Conclusions: Over 22 years, lumbar spine surgery in Italy shifted from decompression to fusion, with shorter hospital stays and regional disparities. Findings highlight evolving practices and inform future spinal care planning.

BREVE SINTESI

In Italia dal 2001 al 2022 la chirurgia per patologie del disco lombare è cambiata: meno decompressioni, più fusioni, ricoveri più brevi (da 6,4 a 3 giorni). Età, tipo di intervento e area geografica influenzano la durata della degenza. La mobilità tra regioni evidenzia differenze di accesso alle cure. Questi dati aiutano a programmare meglio la gestione delle cure spinali.

CITAZIONE BIBLIOGRAFICA

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DOI: https://doi.org/10.1186/s12891-025-09317-0

INNOVATIVE DISPERSING MATERIAL BASED ON SILICA GEL AND DEEP EUTECTIC SOLVENTS FOR THE EXTRACTION OF PESTICIDES FROM HAZELNUTS FOLLOWED BY UHPLC-MS/MS ANALYSIS

Frondaroli MC, Della Posta S, D'Alessandro E, Giannitelli SM, Trombetta M, Gentili A, Gherardi M, De Gara L, Fanali C.

SUMMARY

In this work, a matrix solid-phase dispersion extraction (MSPD) followed by a back-extraction method was used to determine 11 pesticides from hazelnut samples. An innovative dispersing material was prepared and a silica gel bulk was impregnated with a choline chloride:oxalic acid (molar ratio 1:1) deep eutectic solvent (DES).

The material was characterized via Fourier transform infrared spectroscopy, laser diffraction analysis, and scanning electron microscopy coupled with energy-dispersive X-ray spectroscopy. Through a preliminary one-factor-at-a-time study and a final Box-Behnken Design optimization, the sample-to-dispersing material ratio, grinding time, and extraction solvent volume parameters were optimized, yielding the following values: 1:3.8 (w/w), 1.9 min, and 2.4 mL, respectively. Ultra high-performance liquid chromatography-tandem mass spectrometry (UHPLC-MS/MS) analysis was used. The method was validated according to SANTE 11312/2021 guidelines. Recoveries were evaluated at three different spike levels (LOQ, 10LOQ, and MRL) and were all above 50 %. Precision and trueness intra- and interday were all below 20 %. Linearity was studied in the range of interest (LOQ–100 µg kg-1) with determination coefficients greater than 0.991. The limits of detection and quantification were in the range of 0.03–0.5 µg kg-1 and 0.1-1.7 µg kg-1, respectively. The sustainability of the method was evaluated using AGREEprep, BAGI and ComplexMoGAPI software.

BREVE SINTESI

Il lavoro riguarda lo sviluppo e la validazione di un metodo selettivo, altamente sensibile e "green" per l'estrazione e l'analisi di undici pesticidi dalle nocciole, un alimento particolarmente critico per l'estrazione di pesticidi a causa dell'elevato contenuto di grassi. Il metodo è stato validato secondo le linee guida SANTE 11312/2021 (controllo di qualità analitica e validazione dei metodi per l'analisi dei residui di pesticidi negli alimenti e nei mangimi). Per la valutazione della sostenibilità sono altresì stati utilizzati i softwares AGREEprep, BAGI e ComplexMoGAPI.

CITAZIONE BIBLIOGRAFICA

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INSIDE THE SEVESO DIRECTIVE VIA A SYSTEMS-THEORETIC MODEL: A WAY FORWARD FOR RULING INDUSTRIAL SAFETY MANAGEMENT

Nakhal Akel AJ, Simone F, Stefana E, Ansaldi SM, Agnello P, Vallerotonda MR, Di Gravio G, Patriarca R.

SUMMARY

Numerous European industrial facilities are involved in the storing, handling, production, or – generally – use of dangerous substances. They have the potential to cause major accidents with severe consequences for humans, facilities, and the environment. To prevent major accidents and mitigate their consequences, the European Parliament and the Council of the European Union have published the Directive 2012/18/EU (also known as the Seveso III Directive) .The safety management in such establishments is yet a challenging task, and, even if the Directive's prescriptions are meant to increase safety, they bring additional complexity to the equation. This paper aims to investigate how a systemic approach supports the representation of safety management practices in establishments under the Directive, and to explore how the interactions among the stakeholders involved influence the implementation and effectiveness of such safety management practices. For such purposes, the System-Theoretic Accident Model and Processes (STAMP) principles are adopted to map all the relationships among the agents (from the European authorities to the operator of the establishment).

BREVE SINTESI

La gestione della sicurezza in stabilimenti a rischio d'incidente rilevante soggetti alla cosiddetta Direttiva Seveso è ancora un compito impegnativo e, sebbene le prescrizioni della Direttiva siano volte ad aumentare la sicurezza, aggiungono ulteriore complessità alla sua gestione. Questo articolo si propone di indagare in che modo un approccio sistemico supporti la rappresentazione delle pratiche di gestione della sicurezza negli stabilimenti ai sensi della Direttiva e di esplorare come le interazioni tra le parti che compongono il sistema influenzino l'attuazione e l'efficacia di tali pratiche di gestione della sicurezza. A tal fine, vengono adottati i principi del System-Theoretic Accident Model and Processes (STAMP) per mappare tutte le relazioni tra gli agenti (dalle autorità europee al gestore dello stabilimento).

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OUTDOOR CHARACTERIZATION AND GEOMETRY-AWARE ERROR MODELLING OF AN RGB-D STEREO CAMERA FOR SAFETY-RELATED OBSTACLE DETECTION

Rossi P, Cioccolo E, Cutini M, Monarca D, Puri D, Gattamelata D, Vita L.

SUMMARY

Stereo cameras, also known as depth cameras or RGB-D cameras, are increasingly employed in a large variety of machinery for obstacle detection purposes and navigation planning. This also represents an opportunity in agricultural machinery for safety purposes to detect the presence of workers on foot and avoid collisions. However, their outdoor performance at medium and long range under operational light conditions remains weakly quantified: the authors then fit a field protocol and a model to characterize the pipeline of stereo cameras, taking the Intel RealSense D455 as benchmark, across various distances from 4 m to 16 m in realistic farm settings. Tests have been conducted using a 1 square meter planar target in outdoor environments, under diverse illumination conditions and with the panel being located at 0°, 10°, 20° and 35° from the center of the camera's field of view (FoV). Built-in presets were also adjusted during tests, to generate a total of 128 samples. The authors then fit disparity surfaces to predict and correct systematic bias as a function of distance and radial FoV position, allowing them to compute mean depth and estimate a model of systematic error that takes depth bias as a function of distance, light conditions and FoV position. The results showed that the model can predict depth errors achieving a good degree of precision in every tested scenario (RMSE: 0.46–0.64 m, MAE: 0.40–0.51 m), enabling the possibility of replication and benchmarking on other sensors and field contexts while supporting safety-critical perception systems in agriculture.

BREVE SINTESI

Le stereocamere possono migliorare la sicurezza in agricoltura rilevando lavoratori e ostacoli. Uno studio sul modello RealSense D455 ne ha valutato la precisione all'aperto fino a 16 m, in varie condizioni di luce e angoli. Il modello sviluppato corregge gli errori di profondità, garantendo misure più affidabili per sistemi di sicurezza destinati ad essere installati su macchine agricole.

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PERICARDIAL MESOTHELIOMA: DIAGNOSTIC AND THERAPEUTIC MANAGEMENT, A POPULATION-BASED STUDY IN ITALY

Stella S, Consonni D, Ceresoli GL, Dallari B, Perduri R, Storchi C, Migliore E, Gangemi M, Genova C, Benfatto L, Comiati V, Zabeo V, Piro S, Giovannetti L, Grappasonni I, Pascucci C, Larese Filon F, D'Agostin F, Vimercati L, Cozzi I, Calista F, Cascone G, Angelillo IF, Binazzi A, Marinaccio A, Mensi C.

SUMMARY

Pericardial mesothelioma (PM) is an extremely rare tumour for which only case reports, small case series, and case reviews have been published. This is a large population-based study on PM in Italy using data from the Italian National Mesothelioma Registry (Registro Nazionale Mesoteliomi, ReNaM). Information collected includes detailed clinical data on diagnosis and treatment and asbestos exposure. This study confirmed the extreme rarity of PM with crude incidence rates for men and women in 1993–2021 of 0.60 and 0.30 per 10 million person-years, respectively. Epidemiological characteristics of the tumour included late age at onset, male predominance, frequent occupational asbestos exposure, and an extremely poor median survival of 2.8 months. Surgery, when feasible, is the mainstay of treatment. The role of adjuvant treatments is unclear. An early diagnosis combined with standard treatment guidelines could improve patient prognosis and quality of life.

BREVE SINTESI

Il mesotelioma pericardico (PM) è un tumore estremamente raro, con una prognosi sfavorevole e senza un consenso sulla gestione diagnostica e terapeutica. Questo è un ampio studio di popolazione sul PM in Italia, basato sui dati del Registro Nazionale dei Mesoteliomi (ReNaM). Le informazioni raccolte includono dati clinici dettagliati sulla diagnosi e sul trattamento, oltre all'esposizione all'amianto. Lo studio ha confermato l'estrema rarità del PM, con tassi di incidenza grezzi per uomini e donne nel periodo 1993–2021 pari rispettivamente a 0,60 e 0,30 per 10 milioni di anni-persona. Le caratteristiche epidemiologiche del tumore comprendono età avanzata di insorgenza, predominanza maschile, frequente esposizione professionale all'amianto e una sopravvivenza mediana estremamente bassa di 2,8 mesi. La chirurgia, quando possibile, rappresenta il trattamento principale. Il ruolo dei trattamenti adiuvanti non è chiaro. Una diagnosi precoce, combinata con linee guida terapeutiche standard, potrebbe migliorare la prognosi e la qualità di vita dei pazienti.

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PERITONEAL MESOTHELIOMA AND ASBESTOS EXPOSURE: A POPULATION-BASED CASE–CONTROL STUDY IN ITALY, 2000 – 2021

Consonni D, Migliore E, Gangemi M, Cavone D, Vimercati L, Piro S, Giovannetti L, Zabeo V, Comiati V, Curti S, Mattioli S, Landi MT, Gioscia C, Eccher S, Murano S, D'Agostin F, Genova C, Perduri R, Grappasonni I, Stracci F, Cozzi I, Staniscia T, Calista F, Angelillo IF, Galasso R, Tallarigo F, Cascone G, Melis M, Peters S, Kromhout H, Binazzi A, Marinaccio A, Mensi C.

SUMMARY

Objectives: The case-control study assessed the association between occupational asbestos exposure and the risk of peritoneal mesothelioma in the Italian population. Methods: Cases were selected from the National Mesothelioma Registry (2000 – 2021) with complete work history, and 3,045 controls from three case-control studies conducted in six regions (one in 2002 – 2004 and two in 2012 – 2016). Exposure was estimated using a quantitative job-exposure matrix (SYN-JEM) and qualitative expert assessment (available for all cases and for 929 controls in the 2012 – 2016 period). Odds ratios (ORs, 90% CI) were calculated using logistic regression models. Results: In the full analysis (1,591 cases), the OR for exposed cases was 3.66 (CI 3.21 – 4.18; 45.4% of cases and 27.8% of controls exposed). The OR for cumulative exposure was 1.55. In the restricted analysis (290 cases), the OR was 3.35 for exposed individuals and 1.52 for cumulative exposure. Using expert assessment, ORs were higher: 4.32 (full analysis) and 6.35 (restricted analysis), although there is a greater risk of bias. Conclusions: Peritoneal mesothelioma shows a clear association with asbestos exposure, regardless of the assessment method.

BREVE SINTESI

Obiettivi: Lo studio caso-controllo ha valutato l'associazione tra esposizione professionale all'amianto e rischio di mesotelioma peritoneale nella popolazione italiana. Metodi: Sono stati selezionati casi dal Registro Nazionale Mesoteliomi (2000 – 2021) con storia lavorativa completa e 3045 controlli da tre studi caso-controllo condotti in sei regioni (uno nel 2002 – 2004 e due nel 2012 – 2016). L'esposizione è stata stimata con matrice lavoro-esposizione quantitativa (SYN-JEM) e valutazione qualitativa di esperti (disponibile per tutti i casi e per 929 controlli nel periodo 2012 – 2016). Gli OR (IC 90%) sono stati calcolati con modelli di regressione logistica. Risultati: Nelle analisi complete (1591 casi), l'OR per casi esposti è 3,66 (IC 3,21 – 4,18; 45,4% casi e 27,8% controlli esposti). L'OR per esposizione cumulativa è 1,55. Nelle analisi ristrette (290 casi), l'OR è 3,35 per gli esposti e 1,52 per esposizione cumulativa. Utilizzando la valutazione degli esperti, gli OR sono più elevati: 4,32 (analisi completa) e 6,35 (analisi ristretta), sebbene ci sia un maggior rischio di bias. Conclusioni: Il mesotelioma peritoneale mostra una chiara associazione con l'esposizione all'amianto, indipendentemente dal metodo di valutazione.

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PLASTIC ADDITIVES IN NIST STANDARD REFERENCE MATERIAL 2585 AND SETTLED DUST FROM INDOOR DOMESTIC AND WORKING ENVIRONMENTS

Fricano A, Di Filippo P, Pomata D, Riccardi C, Candiano F, Simonetti G, Buiarelli F.

SUMMARY

Background: Micro- and nanoplastics from textiles, rubber, cleaning products, and other sources present in living and working environments can release toxic compounds that are added to plastics to enhance their properties.

Objective: This study explores the presence of plastic additives in settled dust from domestic and workplace indoor environments.

Methods: A Standard Reference Material was used to verify the validity of the analytical method. Settled dust from two occupational environments (a sail loft and a tire shop), and from the home of a worker in the sail loft, was extracted, obtaining two fractions to be injected in GC-MS and in HPLC-MS/MS to detect and quantify 32 plastic additives. Results from working environments were also compared with those from a treating plant of waste electrical and electronic equipment (WEEE).

Results: After a cleanup procedure and the use of matrix-matched calibration curves, the method proved to be reliable.

Significant differences among the concentrations of analytes extracted from the workplace settled dust were not found except for higher values of Bis-2-ethylhexyl adipate (DEHA) and Bis-2-ethylhexyl phthalate (DEHP) in the tire shop and of dimethyl phthalate (DMP) and diisodecyl phthalate (DiDP) in the sail loft. Comparing the results from house and work environments, higher concentrations of additives were found at home. The results from the present workplaces compared with those from a WEEE treating plant showed that the latter was a much more polluted environment.

Conclusions: These preliminary results about the presence of plastic additives in the settled dust from living and working environments suggest that the WEEE treating plant deserves more attention than others. Furthermore, the home environment hides some dangers for the presence of material that can release toxic compounds.

BREVE SINTESI

Micro- e nanoplastiche in ambienti domestici e lavorativi possono rilasciare additivi tossici. Analizzando polvere depositata con GC-MS e HPLC-MS/MS, sono stati rilevati 32 additivi plastici. Concentrazioni più alte sono emerse in casa rispetto ai luoghi di lavoro, mentre l'impianto RAEE è risultato molto più contaminato. I dati indicano rischi anche negli ambienti domestici e la necessità di monitorare gli impianti RAEE.

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POTENTIAL EXPOSURE TO NANO AND MICROPARTICLES DURING INJECTION MOLDING OF GLASS FIBER POLYMER COMPOSITES

Sebastiani F, Tombolini F, Boccuni F, Natale C, Marcolungo C, Militello A, Canepari S, Ferrante R.

SUMMARY

Assessing workers' exposure during the molding of glass fiber-reinforced polymer composites is a complex task, influenced by both the materials used, and the manufacturing processes involved. Besides the possible presence of volatile organic compounds (VOCs), there is growing concern about the release of micro- and nanoparticles, which could lead to longterm exposure that should not be underestimated. In this pilot study, for the first time, the release of glass fibers and nano-microplastics was evaluated according to Tier 1 and Tier 2 of the multi-metric tiered approach proposed by the Organization for Economic Cooperation and Development (OECD). Multi-metric real-time instruments were used to determine particle number concentration (PNC), particle average diameter (Davg), and lung deposited surface area (LDSA), along with time-integrated instrumentation to collect airborne dust for off-line chemical and morphological characterization. The results of the workplace monitoring campaign showed a significantly higher level of airborne particles, particularly at the nanoscale, compared to the background levels. The sampling of airborne dust revealed the presence of ultrafine particles (UFPs), fiber-like structures mainly composed of carbon and oxygen, and aerodispersed SiO2 fibers. According to the OECD guidelines, since significant exposure can not be excluded, based on the results of Tier 2 measurements, an extensive monitoring campaign (Tier 3) has to be conducted with the aim of thoroughly defining the exposure scenario and, consequently, recommending appropriate protection and prevention measures to safeguard workers' health and safety.

BREVE SINTESI

Lo studio analizza l'esposizione dei lavoratori durante la lavorazione di materiali compositi rinforzati con fibra di vetro, un'attività complessa che può comportare rischi per la salute. Oltre ai composti organici volatili, la ricerca evidenzia la possibile emissione di micro- e nanoparticelle, inclusi frammenti di plastica e fibre di vetro, che possono determinare un'esposizione prolungata nel tempo. Utilizzando strumenti di misura avanzati e seguendo l'approccio a livelli proposto dall'OECD, i ricercatori hanno rilevato concentrazioni di particelle nell'aria nettamente superiori ai valori di fondo, soprattutto su scala nanometrica. Le analisi hanno confermato la presenza di particelle ultrafini e fibre aerodisperse. Poiché non è possibile escludere un rischio significativo per i lavoratori, lo studio raccomanda di avviare un monitoraggio più approfondito per definire meglio l'esposizione e individuare misure efficaci di prevenzione e protezione della salute.

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REMANUFACTURING AND LCA: A SYNERGISTIC APPROACH COMBINING STRUCTURAL RELIABILITY, SUSTAINABILITY, AND LIFE MULTI-CYCLE IMPROVEMENT

Felaco A, Vita L, Cantone L, Caputo F, Beneduce S.

SUMMARY

Achieving sustainability is a strategic challenge for manufacturing. This study investigates the environmental and economic benefits of remanufacturing as a circular strategy to extend the lifetime of mechanical components while ensuring structural integrity, safety, and compliance with EU regulations. A mechanical synchronizer shaft used in the continuously variable transmission (CVT) of earth-moving machinery is analysed through a comparative life cycle assessment (LCA). Three scenarios are modelled: (i) the production of a new component; (ii) the remanufacturing of a discarded (at the end of its nominal life) component, considering the current remanufacturable rate of the inspected discarded lot (53.6%); and (iii) the remanufacturing of a discarded component assuming an improved remanufacturable rate (85%). Industrial data combined with Ecoinvent datasets are used to model cradle-to-grave impacts through SimaProR. Results show that a remanufactured component significantly decreases the global warming potential compared with a new component. However, when accounting for the actual remanufacturable rate achievable in practice, the reduction in the global warming index is more limited, highlighting the need to improve remanufacturability to unlock the full environmental benefits. A parametric LCA model integrating the DfRem approach is developed to evaluate how increasing the initial shaft diameter enables multiple remanufacturing cycles. Over multiple remanufacturing cycles, the improved design demonstrates substantial cumulative emission savings compared with repeated production of new components, also confirming the long-term environmental benefits of remanufacturing strategies. In addition to the environmental analysis, a cost evaluation is carried out to evaluate the economic feasibility of the different scenarios. The results confirm that higher remanufacturable rates not only reduce greenhouse gas emissions but also lower overall production costs, providing a comprehensive perspective on the benefits of remanufacturing-oriented design.

BREVE SINTESI

Lo studio mostra come il remanufacturing possa dare nuova vita ai componenti meccanici riducendo emissioni e costi. Analizzando un albero sincronizzatore, emerge che recuperarlo conviene molto più che produrne uno nuovo, soprattutto se aumenta la quota di pezzi riutilizzabili. Un design pensato per più cicli amplifica benefici ambientali ed economici.

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SENSERISC: AN INSTRUMENTED SMART SHIRT FOR RISK PREVENTION IN THE WORKPLACE

Tamantini C, Marra F, Di Tocco J, Di Modica S, Lanata A, Cordella F, Ferrarin M, Rizzo F, Stefanelli M, Papacchini M, Delle Site C, Tamburrano A, Massaroni C, Schena E, Zollo L, Sarto MS.

SUMMARY

The integration of wearable smart garments with multiple sensors has gained momentum, enabling real-time monitoring of users' vital parameters across various domains. This study presents the development and validation of an instrumented smart shirt for risk prevention in workplaces designed to enhance worker safety and well-being in occupational settings. The proposed smart shirt is equipped with sensors for collecting electrocardiogram, respiratory waveform, and acceleration data, with signal conditioning electronics and Bluetooth transmission to the mobile application. The mobile application sends the data to the cloud platform for subsequent Preventive Risk Index (PRI) extraction. The proposed SenseRisc system was validated with eight healthy participants during the execution of different physically exerting activities to assess the capability of the system to capture physiological parameters and estimate the PRI of the worker, and user subjective perception of the instrumented intelligent shirt.

BREVE SINTESI

L'obiettivo di questo articolo è presentare il sistema SenseRisc, una maglia intelligente innovativa progettata per migliorare la sicurezza sul lavoro tramite il monitoraggio multimodale e l'elaborazione intelligente. Il sistema incorpora una moltitudine di sensori per la raccolta completa dei dati, inclusi sensori fisiologici per il monitoraggio dei segni vitali come frequenza cardiaca e frequenza respiratoria, nonché sensori per la rilevazione del movimento e dei livelli di attività del lavoratore. La vera capacità intellettuale del sistema SenseRisc si manifesta nel suo software integrato, che elabora i dati raccolti in tempo reale. La piattaforma software intelligente è in grado di analizzare e correlare i diversi flussi di dati al fine di identificare potenziali rischi per la salute e la sicurezza che possono emergere durante le attività lavorative. Il sistema introduce l'Indice di Rischio Preventivo (PRI), una metrica innovativa che sintetizza dati fisiologici e di movimento per valutare i livelli di rischio associati a diverse condizioni di lavoro. Questo nuovo indicatore rappresenta un notevole progresso rispetto agli studi precedenti, che generalmente si concentravano su un singolo aspetto del monitoraggio della salute.

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SEX- AND GENDER-BASED DIFFERENCES IN ASTHMATIC RESPONSES TO CHEMICAL SENSITIZERS, PARTICULARLY IN OCCUPATIONAL SETTINGS: A SCOPING REVIEW

Caporossi L, Di Renzi S, Partenzi E, Cavallo D, Tomao P, Poli D.

SUMMARY

Asthma is a chronic respiratory disease resulting from a complex interplay of genetic, environmental, and occupational factors. Key environmental risks include exposure to tobacco smoke and respiratory sensitizing agents, many of which are prevalent in workplace settings. In adults, asthma is associated with reduced employment, job instability, and work-related disability, resulting in significant social and economic consequences. This scoping review investigates the role of exposure to respiratory sensitizers in the onset and progression of asthma, considering data from the general population to occupational settings, with a focus on sex and gender as key modifiers of risk, disease severity, and occupational outcomes. Biological studies were also considered to clarify the mechanisms underlying observed sex/gender differences. Epidemiological data indicate that women are disproportionately affected by asthma, experiencing more severe symptoms, higher comorbidity rates, and increased exposure in certain professions such as healthcare, cleaning, and textile work. These disparities are attributed to both sex-related factors (e.g., hormonal influences) and gender-related factors (e.g., occupational roles, smoking habits). Although traditional job roles are changing, women continue to face greater occupational asthma risks. As roles evolve, physiological sex-based differences may become increasingly relevant in shaping asthma susceptibility. This review emphasizes the need for sex- and gender-sensitive strategies in asthma prevention, surveillance, and management, especially in occupational health contexts.

BREVE SINTESI

L'asma è una patologia respiratoria dovuta a diversi fattori, genetici, ambientali e anche occupazionali. L'esposizione ad agenti chimici sensibilizzanti respiratori può incidere considerevolmente nell'insorgenza della patologia. La review esplora gli aspetti fisiologici e biochimici ed epidemiologici che contribuiscono ad evidenziare delle differenze legate al sesso e al genere nella insorgenza e nella gravità della patologia, con particolare focus agli ambienti di lavoro.

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STABILITY AND FLUCTUATIONS IN MUSCULOSKELETAL DISORDER SYMPTOMS: THE ROLES OF CHRONIC AND ACUTE JOB DEMANDS AND RESOURCES

Marzocchi I, Isolani S, Ghezzi V, Ronchetti M, Fusco L, Spinella F, Ghelli M, Olivo I, Persechino B, Barbaranelli C.

SUMMARY

Despite symptom fluctuations being a key aspect of living with a musculoskeletal condition, previous research has largely treated MSDs as stable over time, implicitly assuming a static course of symptom development. Guided by the Dynamic Equilibrium Model and the Job Demands-Resources model, this study aims to fill this gap by examining the stability and variability of MSD symptoms over a short-to-medium time frame (i.e., three months). We also investigate whether, and to what extent, temporary job demands and resources influence MSD symptoms beyond the effects of chronic work conditions. A shortitudinal design with three measurement points was conducted with 795 Italian employees (60.5 % females; mean age = 39.8), using Doubly Latent Multilevel Structural Equation Modelling. Results indicate that MSD symptoms are relatively stable, with approximately two-thirds of the reliable variance attributable to trait-like factors. Nevertheless, meaningful within-person fluctuations were also observed, partly driven by variations in work characteristics. Notably, while chronic stressful conditions (e.g., consistently high workload) had the strongest impact on MSDs, higher-than-usual workload had notable, situation-dependent effects on MSDs (both directly and indirectly via reduced psychological health). In contrast, control and support from colleagues functioned as protective factors only when consistently available. Overall, the present study highlights the need for comprehensive occupational health interventions addressing both situational and chronic work factors to reduce the risk of MSDs.

BREVE SINTESI

Lo studio ha riguardato 795 lavoratori italiani mostra che i sintomi dei disturbi muscoloscheletrici (MSD) sono in gran parte stabili, ma possono variare in base a cambiamenti nelle condizioni lavorative. Carichi di lavoro cronici aumentano il rischio di MSD, mentre supporto e controllo sono protettivi solo se costanti. Anche carichi di lavoro temporanei possono influire negativamente, soprattutto sulla salute psicologica. Servono interventi che agiscano sia su fattori cronici che situazionali.

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THE PSYCHOLOGICAL IMPACT OF ASBESTOS EXPOSURE: RISK PERCEPTION AND EMOTIONAL DISTRESS AMONG FORMER WORKERS IN TUSCANY

Bonafede M, Chellini E, Bugani M, Marinaccio A, Miligi L, Piro S, Granieri A, Franzoi IG, Sauta MD, Baldassarre A, Cacciarini V, Consigli R, Dini F, Fani S, Guglielmi G, Melosi A, Pantani E, Roselli A, Sisinni AG, Spalla G, Tomberli L, Binazzi A.

SUMMARY

Background: Asbestos exposure remains a global health hazard, causing significant mortality from related diseases. Despite bans in many countries, including Italy (1992), former asbestos workers still face health risks and psychological distress. This study explores the psychological impact among former workers enrolled in Tuscany Region's health surveillance program, focusing on risk perception, emotional distress, and service evaluation.

Methods: A cross-sectional study (Oct 2021–Sep 2022) involved 362 former asbestos-exposed workers. Structured telephone interviews by trained psychologists assessed risk perception, self-perceived exposure, psychological distress (sadness, anxiety, anger, fear), and satisfaction with health services. Statistical analyses, including logistic regression, examined associations between risk perception and psychological symptoms.

Results: 77.9% believed they were at future risk of asbestos-related disease; 61.1% reported significant past exposure. Emotional distress was common: sadness (mean 5.1), anger (5.3), fear (4.9), anxiety (4.0). Risk perception strongly correlated with distress: those perceiving future risk showed higher fear (OR 2.86) and anger (OR 2.56); uncertainty about past exposure increased anxiety (OR 13.0) and anger (OR 3.60). Knowing someone affected was linked to greater sadness (OR 3.92) and fear (OR 3.94). Despite distress, services were positively rated, especially staff availability (56.6%) and assistance quality (55.2%).

Conclusions: Findings highlight long-term psychological effects of asbestos exposure and the need for integrated mental health support in surveillance programs. The strong link between risk perception and distress suggests psychological interventions (counseling, education) should complement medical monitoring. Addressing these needs can improve well-being and reduce uncertainty and fear. Future research should develop targeted interventions for this vulnerable group.

BREVE SINTESI

Nonostante il divieto dell'amianto, gli ex-lavoratori continuano a convivere con timori per la salute e vissuti emotivi complessi. Uno studio in Toscana evidenzia come la percezione del rischio si associ a emozioni intense, mentre i servizi sanitari risultano apprezzati. Integrare supporto psicologico nei programmi di sorveglianza potrebbe favorire maggiore benessere e ridurre l'incertezza.

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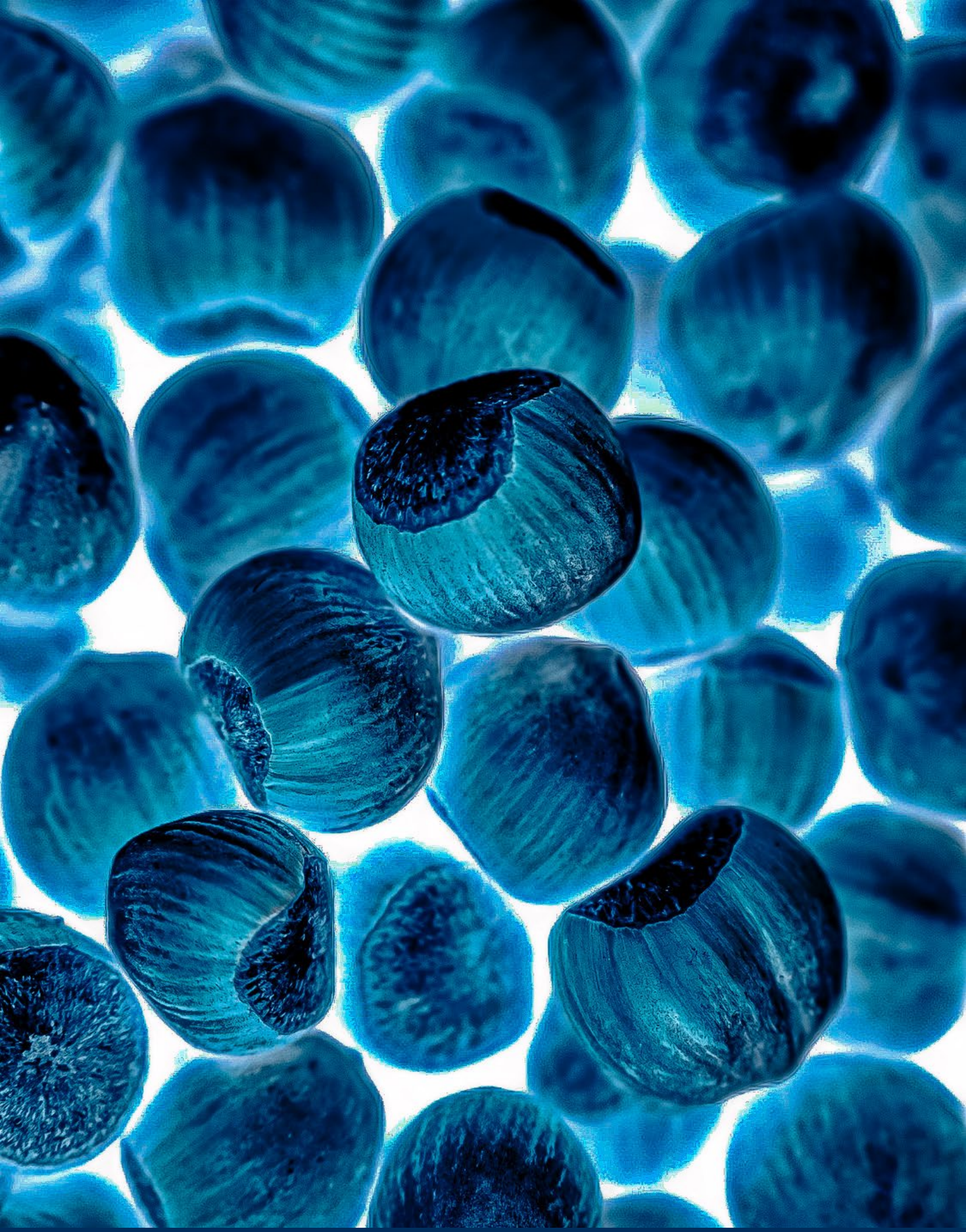

Inail
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