Introduction Occupational exposure to animals and food of animal origin is a poorly characterized risk factor for salmonellosis and campylobacteriosis, the main causes of bacterial gastroenteritis in the Western world.

Objectives We performed a population-based registry study in The Netherlands to assess whether differences exist in the incidence of reported salmonellosis and campylobacteriosis cases among occupational groups, and whether these differences are reflected in the magnitude of exposure to these pathogens using serological data.

Methods Person-level occupational data for all Dutch residents during 1999–2016 were linked to lab-confirmed salmonellosis and campylobacteriosis data and to serological data from a national sero-survey. Standardized incidence ratios (SIRs) for salmonellosis and campylobacteriosis among occupational sectors and specific high-risk occupations were calculated based on the total employed population. Moreover, *Salmonella* and *Campylobacter* sero-incidence rates were compared among sectors and high-risk occupations.

Results Occupational exposure to live animals or manure and working in the sale of animal-derived food products were associated with significantly increased risks of salmonellosis (SIR 1.55 to 1.82) and campylobacteriosis (SIR 1.36 to 1.65). Moreover, incidences were significantly higher in specific industrial sectors, as well as healthcare and social work sectors. Mean sero-incidence rates ranged from 1.28 to 2.30 infections/person-year for *Campylobacter*, and 0.36 to 0.99 for *Salmonella*; with only slightly higher rates for people in high-risk occupations.

Conclusion Significant differences in reported salmonellosis and campylobacteriosis incidence exist among occupational sectors, with the highest incidence in those persons occupationally exposed to live animals. These differences are only partially reflected in the serology.

RF-149 MUSIC PROFESSORS: AMBASSADORS FOR THE PREVENTION OF HEARING LOSS IN MUSICIANS

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Introduction Several studies document the occurrence of hearing problems in musicians due to the constant exposure of loud sounds during activities such as group rehearsals, music performances and individual practices. Most of them reveal that many musicians are unaware of the risks faced in making music and are resistant to preventive actions. However, it seems reasonable to reverse this context based on the development of preventive actions during the graduation time of this public.

Objectives To suggest a protocol of educational actions regarding hearing health with professors from higher education institutions in music.

Methods The elaboration of the protocol of educational actions in hearing health was based on active learning and problematizing methodologies, to happen through activities developed in the academic environment.

Results The protocol was developed to be applied in six modules, with of 1 h 30 min each, and contemplates the following topics (1) notions of anatomy-physiology of hearing, effects of high sound intensity, control measures and means of prevention of hearing loss; (2) acoustic characteristics of the

work environment and workload in practical music classes and/or supervising internships (3) workshops towards the use of sound pressure level measurement apps and hearing screening apps; (4) composition and recording of jingles and podcasts related to the risks of exposure to high intensity music to play for music students.

Conclusion The development of the activities planned in the protocol can lead professors to incorporate the concepts and attitudes related to hearing health, to act as promotion agents to positively influence new generations of musicians with regard to that matter. The results must be continuously evaluated to identify the weaknesses and potential of the protocol.

Symposia

Symposia

S-55 NOVEL MECHANISMS UNDERLYING THE CARCINOGENICITY OF NIGHT SHIFT WORK

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Objectives Understanding the mechanisms by which an exposure causes cancer can be critical to establishing causality and to developing successful prevention/intervention strategies. Multiple mechanisms underlying the carcinogenicity of night shift work have been proposed, including several novel ones in recent years, though specific mechanistic links remain uncertain.

Methods Novel mechanisms for the carcinogenicity of night shift work will be reviewed. In the context of these mechanisms, the methodologic limitations that continue to plague human mechanistic studies of night shift work will also be discussed.

Results Multiple animal studies and some human mechanistic studies have pointed to suppressed DNA damage repair, epigenetic impacts and gut dysbiosis as novel mechanisms by which night shift work may cause cancer. Human mechanistic studies continue to suffer from multiple limitations such as small sample sizes, poorly defined shift schedules, inappropriate timing of biospecimen collection relative to conduct of night shift work and inadequate consideration of diurnal variation in biomarker measures.

Conclusions While there is compelling evidence for multiple novel mechanisms underlying the potential carcinogenicity of night shift work, additional high quality human mechanistic studies are needed to establish the relevance of these mechanisms.

S-58 MIXED EXPOSURES TO CLEANING AND DISINFECTING CHEMICALS IN HEALTHCARE OCCUPATIONS

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Introduction Certain cleaning and disinfecting products are used extensively in healthcare and associated with asthma and

respiratory symptoms. However, quantitative exposures to these products are not well-characterized. The objective of this study was to characterize exposures to cleaning and disinfecting chemicals in healthcare occupations.

Methods Exposure assessments were conducted at five hospitals targeted 14 healthcare occupations. Mobile-area and personal real-time and time-integrated air monitoring was conducted for volatile organic compounds (VOCs), and 14 specific VOCs were quantified, including total VOCs (TVOCs). Quaternary ammonium compounds (QACs) were quantified at one hospital. Exposure data were summarized by occupation and geometric means (GMs) and geometric standard deviations (GSDs) were calculated. GM exposure estimates for product-application tasks were obtained from linear regression models.

Results The GMs for TVOCs were highest among nursing assistants, licensed practical nurses, and medical equipment preparers (range: 4367–2142 ppb), followed by respiratory therapists, pharmacy technicians, registered nurses, housekeepers, floor strippers/waxers, and dental assistants (range: 2120–1565 ppb); GSDs varied from 1.06 to 9.01. GMs for selected VOCs were: ethanol (1.54–2594 ppb), acetone (18.5–70.6 ppb), chloroform (0.09–0.57 ppb), α -pinene (0.04–0.19 ppb), and d-limonene (0.12–4.23 ppb). Real-time TVOC GMs were the highest for the product-application tasks of using skin wipes containing QACs, using enzymatic cleaners, using glass-cleaning products, cleaning instruments with high-level disinfectants, and using detergents to clean surfaces (2091–1049 ppb). Specific VOC levels were strongly associated with product-application tasks; using products containing bleach or QACs predicted levels of chloroform and d-limonene, respectively. Concentrations of QACs were low in short-duration (0.23–1.5 $\mu\text{g}/\text{m}^3$) and full-shift (0.006–0.028 $\mu\text{g}/\text{m}^3$) area air samples.

Conclusions Exposure levels of total and specific VOCs varied by occupations and tasks. These estimates can be used to generate a job-task exposure matrix for use in epidemiologic studies.

S-66

COVID-19 AND THE WORKPLACE

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The SARS-CoV-2 virus pandemics has raised several challenges at the workplace. Within the omega-net COVID-19 taskforce, we developed standardized COVID-19 questionnaires for occupational research, a multi-country COVID-19 Job Exposure Matrix, and research on COVID-19 as an occupational disease. The compiled questionnaire resource covers all key aspects of the COVID-19 pandemic, including: COVID-19 diagnosis & prevention, Health and demographic, Use of personal protective equipment, Health effects, Work-related effects, Financial effects, Work-based risk factors, Psychosocial risk factors, Lifestyle risk factors, and Personal evaluation of the impact of COVID-19. For each of the domains additional questions are available. A second questionnaire (in a short and along version) focusses on occupational risk factors for SARS-CoV-2 infection and COVID-19 disease. The questionnaires are available online

at <https://omeganetcohorts.eu/news/covid19-questionnaires-omeganet/>. The JEM was developed by experts from three European countries (Denmark, the Netherlands, UK), who defined the relevant exposure and workplace characteristics with regard to the possible exposure to SARS-COV 2 infection. The C19-JEM contains four determinants of transmission risk (number of people, type of people, indirect contact and location), two mitigation measures (social distance and face covering), and two social factors (income insecurity and migrant workers). Finally, we developed and piloted a questionnaire on COVID-19 as occupational disease, which provide data on 1) COVID-19 as occupational disease or injury, 2) criteria for recognition and compensation regarding exposure, disease, role of use of PPE and of competing non-occupational exposure; and 3) what can be compensated. Results are available from 36 largely European countries. Through the development and implementation of tools we not only provide instruments, but also insights on the occupational risks and diseases in relation to SARS-COV 2.

S-73

ARE EARLY WORKING LIFE PATTERNS RELATED TO THE COURSE OF FUTURE SICKNESS ABSENCE DUE TO COMMON MENTAL DISORDERS?

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Introduction In recent decades, the labour market has evolved into temporary employment, part-time work, and long-term unemployment, especially affecting young population and women. Transitions between states during working life could affect mental health.

Objectives To assess the relationship between early working life (EWL) patterns and the future course of sickness absence (SA) due to mental disorders.

Methods Cohort study of a working sample between 18 and 28 years of age, residents in Catalonia, with at least one episode of SA due to a mental disorder between 2012 and 2014. Reconstruction of individual working life trajectories previous to the SA were carried out by sequence analysis based on four work-related states (permanent, temporary contract, unemployment and without social security coverage). By optimal matching, patterns were identified out of clustering similar working trajectories. Identification of SA trajectories were made by latent class growth modelling analysis. Adjusted multinomial logistic regression models were applied to assess the relationship between early working life patterns and SA trajectories.

Results Among men, fluctuating (aOR 1.25 [95% CI: 0.57–2.74]) or delayed (aOR 1.79 [95% CI: 0.59–5.41]) entry into the labour market showed a trend towards a middle stable accumulation of SA days. In women, an increasing permanent and fluctuating employment pattern (aOR 2.41 [95% CI: 1.01–5.75]) at the beginning of their EWL was related to a decreased accumulation of future days on SA due to mental disorders (aOR 2.08 [95% CI: 1.18–3.66]) rather than to a low stable trajectory.

Conclusions An unstable early working life built on a high number of transitions between temporary contracts, unemployment and lack of social security coverage states is related to a future worse SA course due to mental diagnosis.