

# Trends in the medical repatriation of Filipino seafarers: a ten-year study of a Philippine maritime shipping company (OSM Maritime)

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## ABSTRACT

**Background:** Seafarers, confronted with unique health challenges, occasionally necessitate medical repatriation. This study examines the trends in medical repatriation cases among Filipino seafarers employed by OSM Maritime shipping company over a 10-year period from 2013 to 2022.

**Materials and methods:** Medical records of OSM Maritime seafarers were reviewed, obtaining causes for and dates of medical repatriation. International Classification of Diseases (ICD-11) was utilised to classify repatriation cases. Proportion of repatriation cases were calculated and their annual trends were analysed.

**Results:** Our findings reveal that the majority of repatriation cases are attributed to injury/trauma (19.91%), musculoskeletal (18.40%), gastrointestinal (16.56%), cardiovascular (8.77%), infectious (6.82%), and genitourinary conditions (5.30%). Significantly, the study identifies a declining trend in the proportion of cardiovascular, gastrointestinal, and genitourinary conditions in annual repatriation cases, particularly in ischaemic heart conditions, cholelithiasis, cholecystitis, and urinary calculus.

**Conclusions:** These results emphasize the critical need for multisectoral collaboration to enhance seafarers' health and well-being. Prioritizing comprehensive care programmes, ensuring safe working conditions, and exploring holistic healthcare initiatives are essential steps to enhance seafarers' occupational health.

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**Keywords:** medical repatriation rates, Filipino seafarers, maritime industry, holistic care programme, occupational health

## INTRODUCTION

The maritime industry plays a crucial role in global trade, with seafarers serving as the backbone of this industry [1]. However, the nature of their work exposes seafarers to unique health risks and challenges, which sometimes lead to medical repatriation – the process of returning seafarers to their home country for medically-related reasons [2, 3]. Medical repatriation may disrupt the seafarers' employment

and career progression and may impose significant financial and emotional burdens on both the individuals and the maritime shipping companies [4]. Moreover, repatriation adds additional load to the remaining crew onboard, and disrupts the operation and planning of the ship which usually takes several weeks and months to create. Operationally, this will also pose challenges to the shore employees as it gives rise to an urgent hiring to replace the post of the repatriated sea-

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farers, and may lead to changes in route or ports and delay in the delivery of goods and services. Thus, understanding the trends and factors influencing medical repatriation rates is essential for enhancing the well-being of seafarers and improving the overall sustainability of the maritime industry [4].

The Philippines has long been recognized as a major supplier of seafarers globally, accounting for around 20% of the global workforce [5, 6]. OSM Maritime, one of the largest maritime shipping companies in the Philippines, serves as an important case study for investigating the medical repatriation patterns and evaluating the effectiveness of interventions aimed at reducing medical repatriation rates [7]. Holistic health care programme, introduced by the company in 2018, provides an opportunity to evaluate impact of such initiative on medical repatriation rates.

In this study, we focus on examining the repatriation cases among Filipino seafarers employed by OSM Maritime shipping company over a 10-year period, from 2013 to 2022. A comprehensive understanding of the causes and patterns of repatriation cases can provide valuable insights into the health concerns and challenges faced by seafarers, thereby guiding the development of targeted interventions and support systems.

## MATERIALS AND METHODS

### STUDY POPULATION

This study analysed medical repatriation cases among seafarers employed by OSM Maritime shipping company from 2013 to 2022. To safeguard the privacy and confidentiality of the seafarers, a thorough de-identification process was carried out on the records before analysis.

### DATA COLLECTION

Extensive reviews of medical records of OSM Maritime seafarers were conducted. Information related to medical repatriation cases, including the dates of repatriation, was extracted from these records. The causes leading to medical repatriation were categorised in accordance with the International Classification of Diseases, 11<sup>th</sup> edition (ICD-11) [8]. Subsequently, the collected data was organized based on organ systems to facilitate further analysis.

### DATA ANALYSIS

Descriptive analysis was employed to examine the medical repatriation cases in this research. Percentages were calculated to determine the proportion of cases within specific organ systems and disease categories. The dynamics of repatriation cases were also explored by analysing the annual trends. Linear regression was performed to analyse the trends of proportion of repatriation cases for each year. Microsoft Excel (365) was utilised for data management,

and Graph Pad Prism 8.0 (Boston, Massachusetts, USA) was employed for constructing figures to illustrate the findings.

## RESULTS

To investigate the trends in medical repatriation rates among Filipino seafarers, we conducted an extensive analysis of medical repatriation cases involving seafarers employed by OSM Maritime shipping company over a 10-year period, spanning from 2013 to 2022. There are a total of 924 repatriation cases in this 10-year period.

### DISTRIBUTION OF REPATRIATION CASES BY ORGAN SYSTEM

Figure 1 illustrates the distribution of cases categorised by organ systems, following the ICD-11 codes. Within this dataset, injuries constituted the highest proportion of cases, accounting for 184 out of 924 (19.91%), with musculoskeletal conditions ranking closely behind at 170 (18.40%) cases. Additionally, other organ systems with noteworthy proportions of cases include gastrointestinal (153/924, 16.56%), cardiovascular (81/924, 8.77%), infectious (63/924, 6.82%), genitourinary (49/924, 5.30%), and dermatological (48/924, 5.19%) conditions.

### DISTRIBUTION OF REPATRIATION CASES IN EACH ORGAN SYSTEM

We determined the number of cases in each organ system. Among injury or trauma cases (Fig. 2), the highest proportion are those with hand injury ( $n = 52/184$ , 28.27%), followed by smoke inhalation ( $n = 13/184$ , 7.07%). There were also high proportion of cases with burn injury ( $10/184$ , 5.43%), knee injury ( $10/184$ , 5.43%), head injury ( $9/184$ , 4.89%), and shoulder injury ( $9/184$ , 4.89%).

Within musculoskeletal conditions (Fig. 3), low back pain emerged as the most prevalent, with 51 cases out of 170 (30.00%), followed by joint pains ( $29/170$ , 17.06%). Additional significant conditions included gout ( $12/170$ , 7.06%), limb pains ( $11/170$ , 6.47%), joint effusion ( $10/170$ , 5.88%), and soft tissue disorders ( $9/170$ , 5.29%).

Among gastrointestinal conditions (Fig. 4), acute appendicitis was the most commonly reported case, accounting for 27 out of 153 cases (17.65%), followed by abdominal or pelvic pain ( $24/153$ , 15.69%). Other notable gastrointestinal cases included haemorrhoids ( $16/153$ , 10.46%), hernias ( $13/153$ , 8.50%), cholelithiasis/cholecystitis ( $10/153$ , 6.54%), and melena ( $7/153$ , 4.58%).

Turning to cardiovascular disease (Fig. 5), hypertension emerged as the leading cause of repatriation, constituting 34 out of 81 cases (41.98%), followed by chest pain ( $14/81$ , 17.28%), and coronary artery disease ( $10/81$ , 12.35%). The remaining cases encompassed varicose veins and other lymphatic diseases.

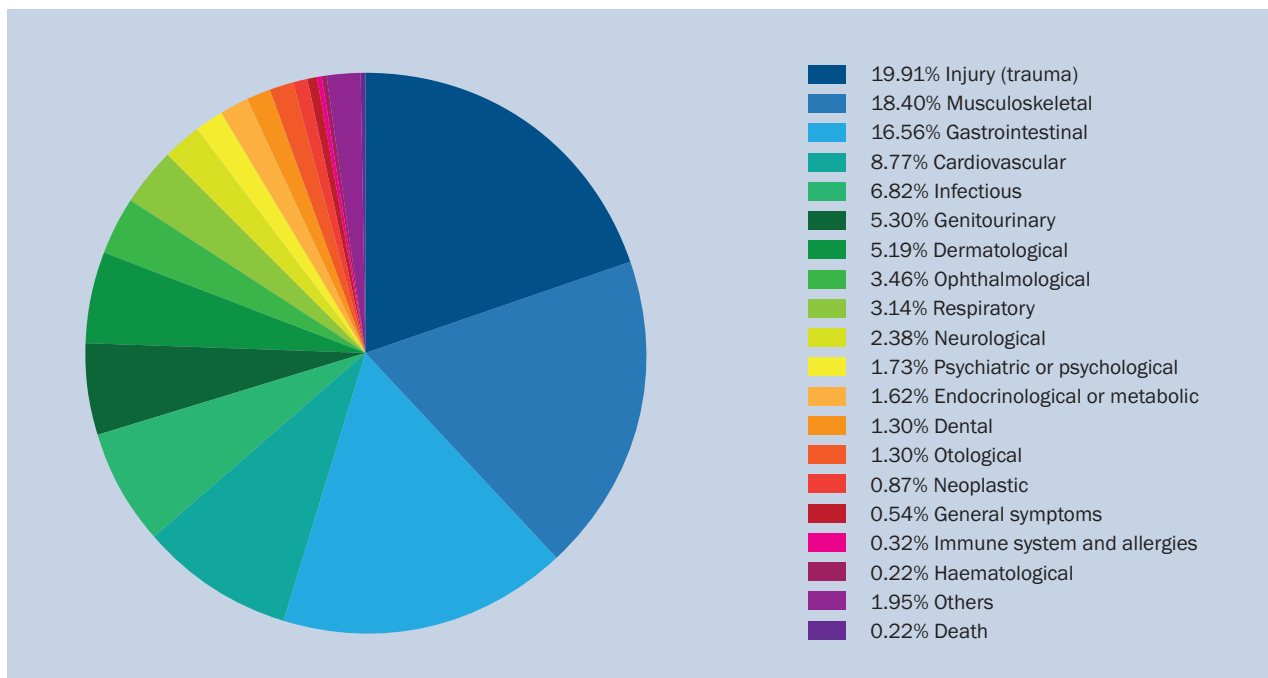


Figure 1. Percentage of each organ system in the total repatriation cases from 2013 to 2022 (total = 924)

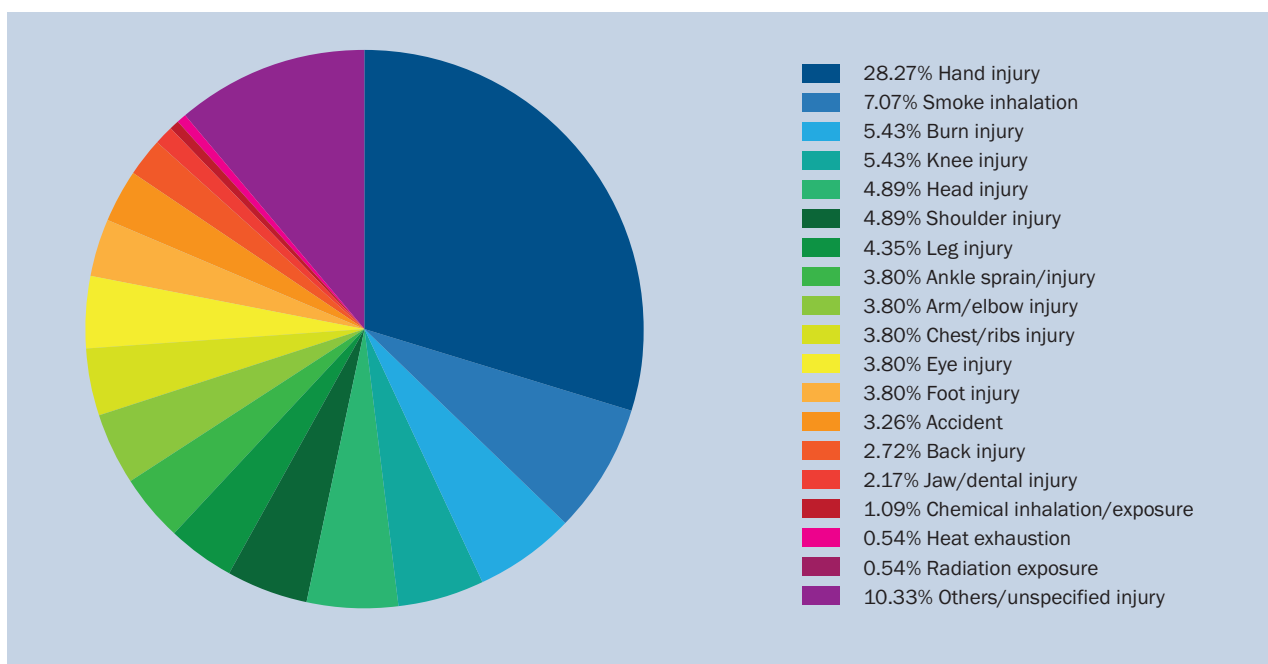


Figure 2. Characteristics of injury or trauma cases among repatriated OSM seafarers from 2013 to 2022 (total = 184)

Within infectious repatriation cases (Fig. 6), deep folliculitis or pyogenic abscess of the skin was the most prevalent, accounting for 20.63% of cases. Notably, coronavirus disease 2019 (COVID-19) emerged as a significant factor, comprising 14.29% of cases, although this infection only surfaced in 2020. Other infectious diseases included dengue (11.11%), malaria (9.52%), tuberculosis (9.52%), and varicella (9.52%).

In the realm of genitourinary conditions (Fig. 7), calculus or urinary tract were the most prevalent with 16 out of 49 cases (32.66%). Another common condition included urinary tract infection (5/49, 10.20%), followed by haematuria (3/49, 6.12%), orchitis/epididymitis (2/49, 4.08%), and testicular pain (2/49, 4.08%).

The remainder of repatriation cases are presented in Supplementary Table 1 (see journal website). Notable cases within

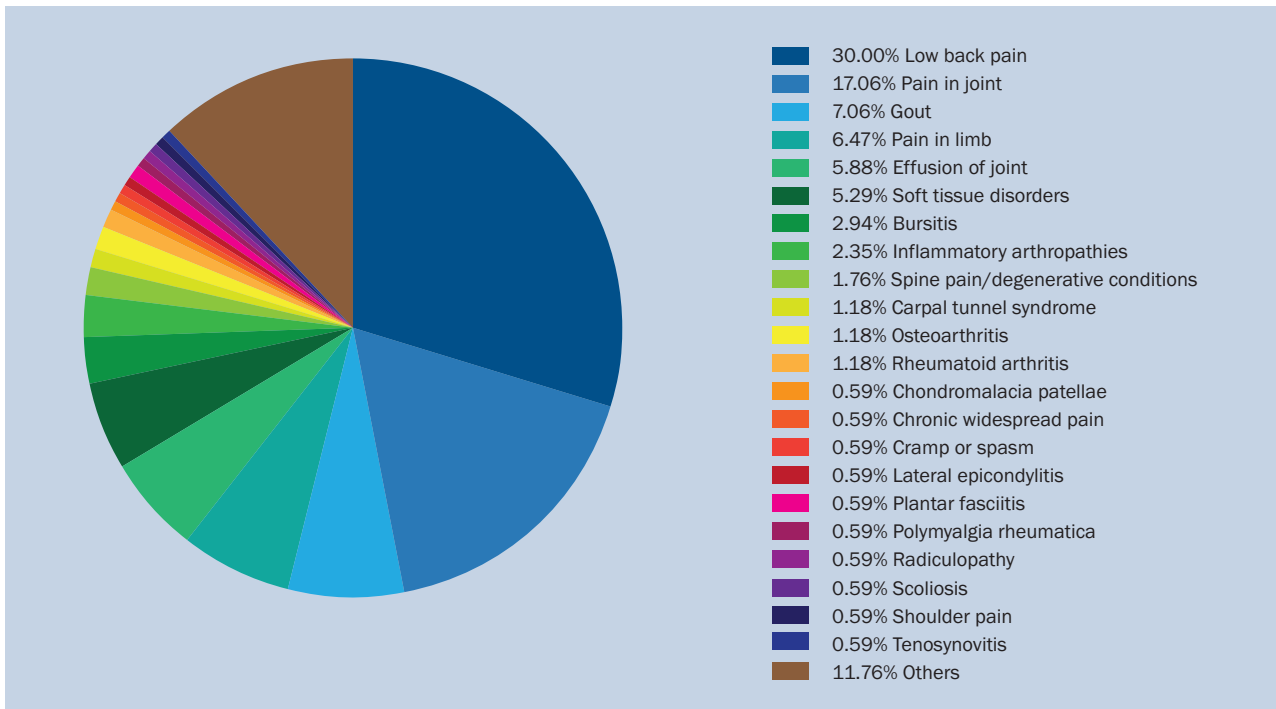


Figure 3. Characteristics of musculoskeletal cases among repatriated OSM seafarers from 2013 to 2022 (total = 170)

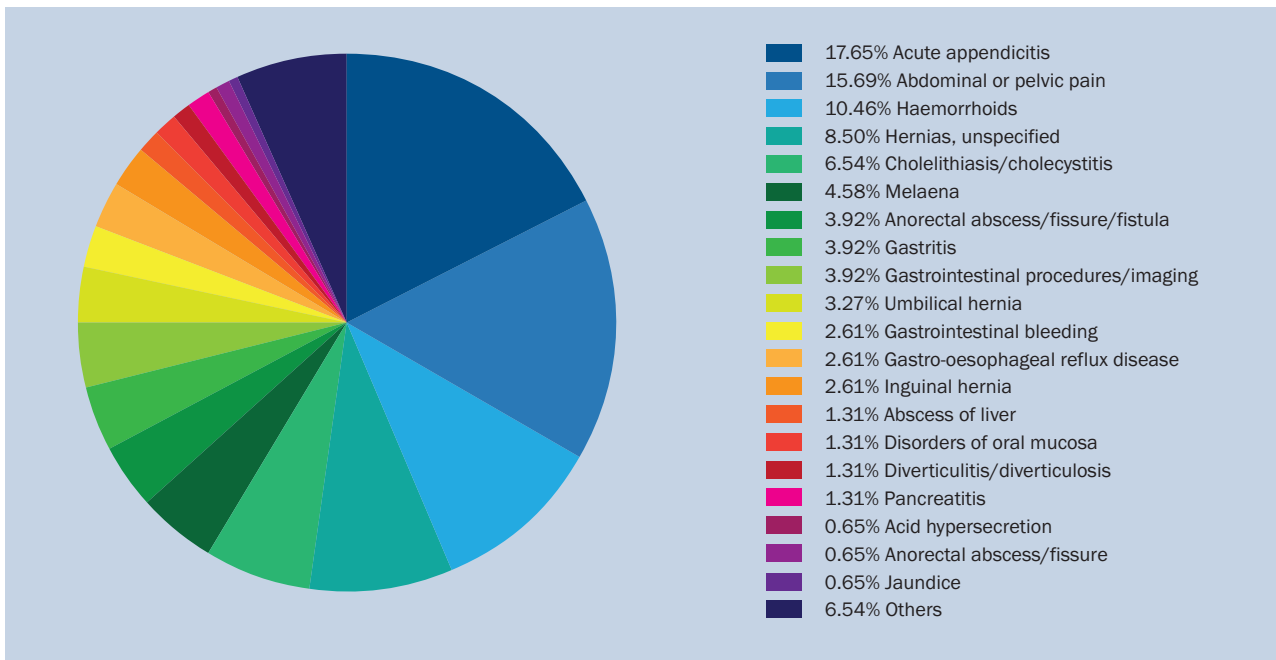
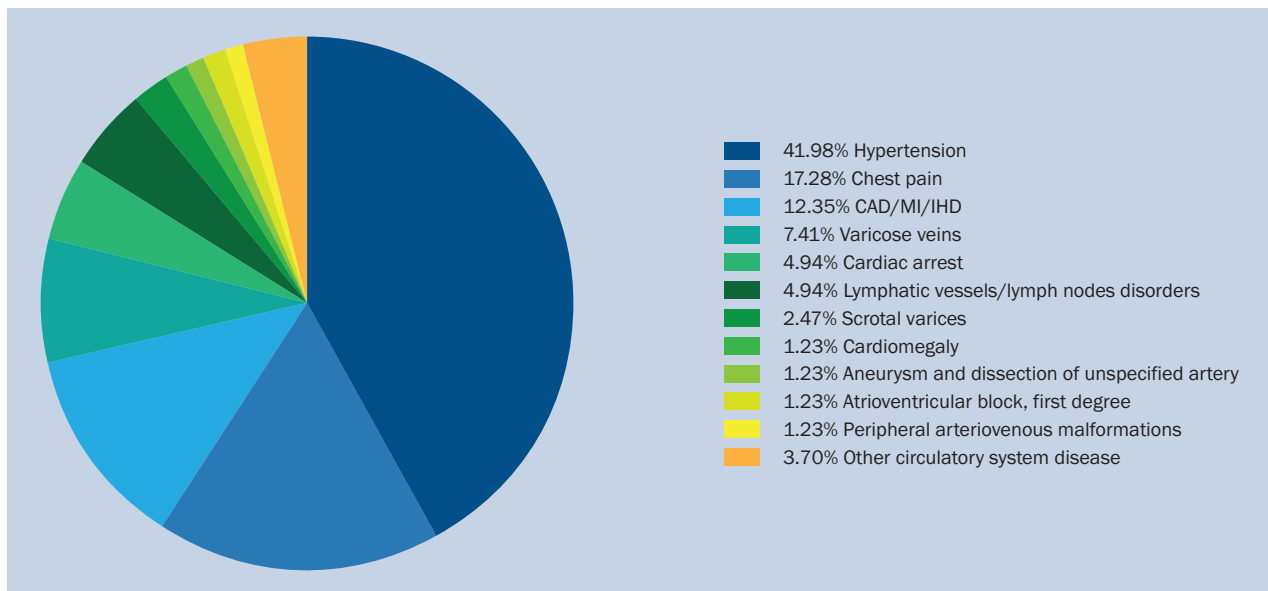


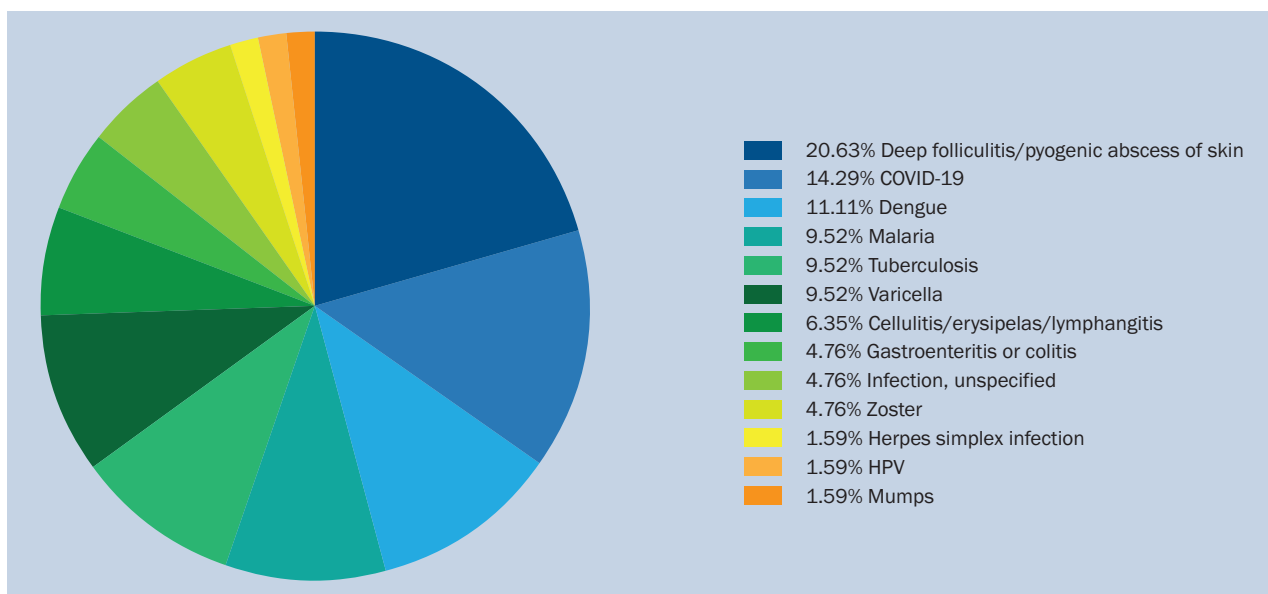
Figure 4. Characteristics of gastrointestinal cases among repatriated OSM seafarers from 2013 to 2022 (total = 153)

dermatological conditions (48 cases in total) encompassed subcutaneous masses or swellings (14/48, 29.17%), contact dermatitis (8/48, 16.67%), and eczema (8/48, 16.67%). The most common ophthalmological cases (32 in total) included pterygium (5/32, 15.63%), blurred vision (2/32, 6.25%), and cataract (2/32, 6.25%). Respiratory cases (29 in total) were predominantly represented by pneumonia (6/29, 20.69%), dys-

pnoea (3/29, 10.34%), and acute upper respiratory infections (6/29, 10.34%). Neurological cases (22 in total) primarily included cerebral strokes (5/22, 22.73%), epilepsy/seizures (3/22, 13.64%), and headaches (3/22, 13.64%). Psychiatric or psychological conditions (16 in total) consisted mainly of acute and transient psychotic disorders (6/16, 37.50%), anxiety/fear disorders (2/16, 12.50%), and adjustment dis-



**Figure 5.** Characteristics of cardiovascular cases among repatriated OSM seafarers from 2013 to 2022 (total = 81); CAD/MI/IHD – coronary artery disease/myocardial infarction/ischaemic heart disease



**Figure 6.** Characteristics of infectious cases among repatriated OSM seafarers from 2013 to 2022 (total = 63); COVID-19 – coronavirus disease 2019; HPV – human papilloma virus

orders (2/16, 12.50%). Among endocrinological or metabolic disorders (15 in total), the most common were nontoxic goitre (5/15, 33.33%), diabetes mellitus (4/15, 26.67%), and hypokalaemia (4/15, 13.33%). Otoological conditions (12 in total) were primarily represented by hearing impairment disorders (4/12, 33.33%) and otitis media (2/12, 16.67%).

### YEARLY PERCENTAGE OF ORGAN SYSTEM REPATRIATION CASES

To understand the dynamics of medical repatriation, we explored trends in repatriation rates within each organ

system over the 10-year study period. To achieve this, we took the cases for each organ system. We calculated their contribution to the total repatriation cases for each year, thereby determining the percentage of yearly cases for each organ system. Subsequently, we compared these percentages across the organ systems. This comprehensive analysis is presented in Figure 8, which illustrates the annual distribution of repatriation cases at the organ system level. Additionally, Figure 9 sheds light on the fluctuations in these yearly percentages for the primary organ system causes of repatriation. More comprehensive data on the dynamics

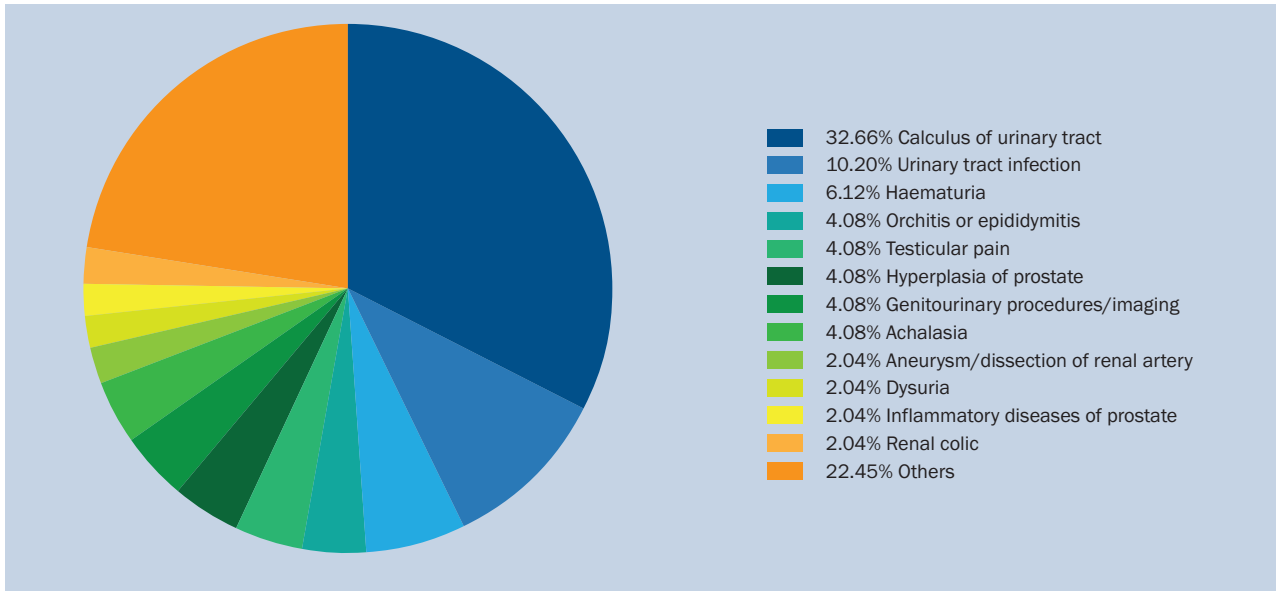


Figure 7. Characteristics of genitourinary cases among repatriated OSM seafarers from 2013 to 2022 (total = 49)

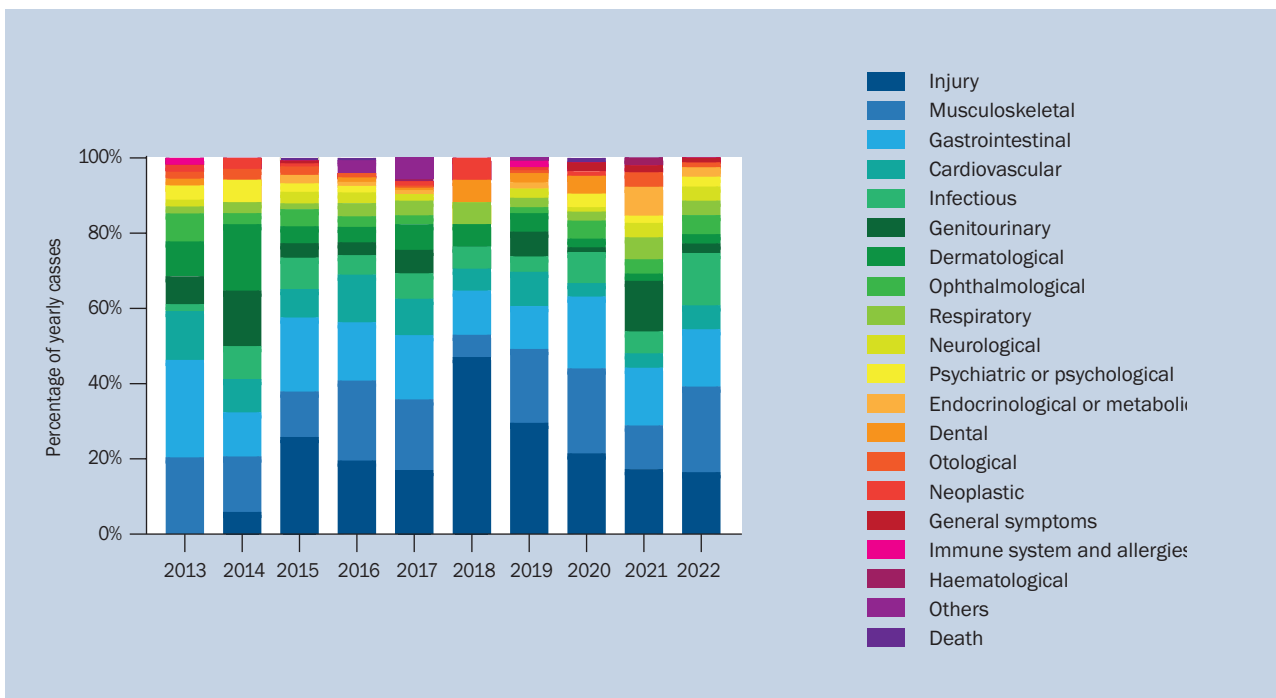
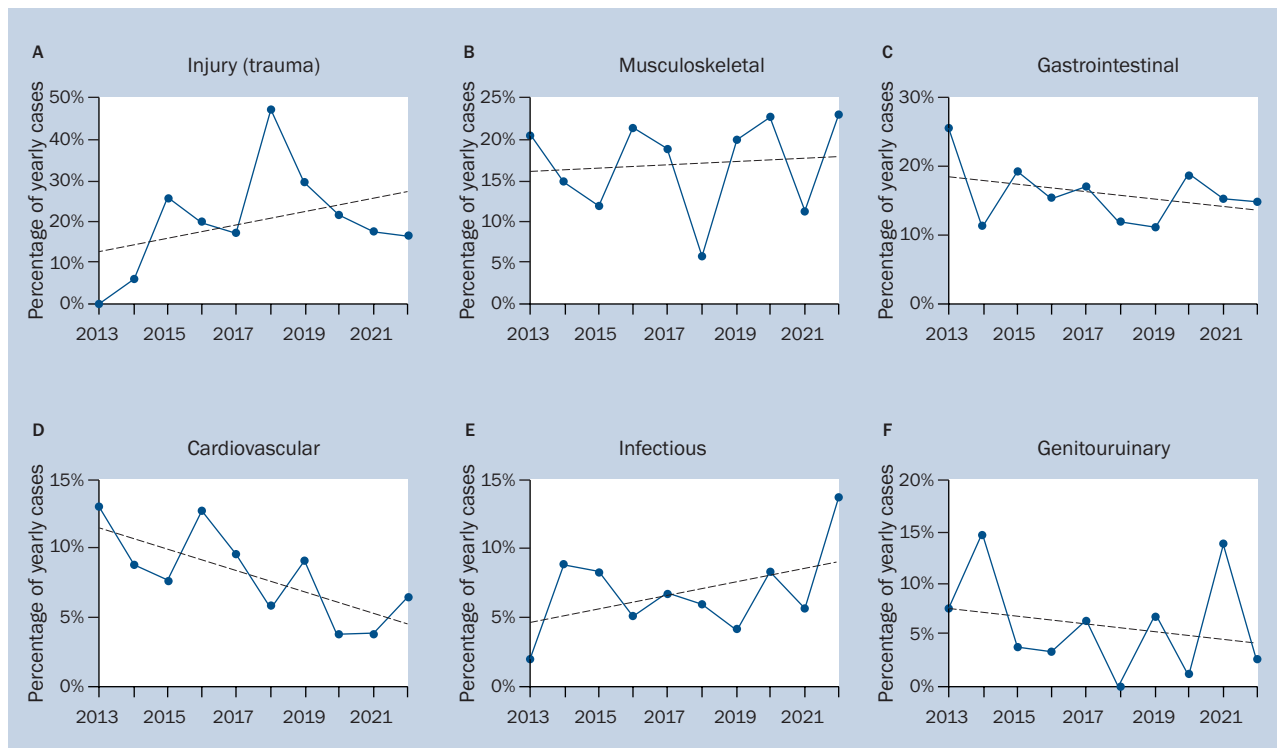


Figure 8. The proportion of repatriation cases for each year per organ system

of organ system is presented in Supplementary Table 2 (see journal website).

Notably, a consistent decline in medical repatriation rates within the cardiovascular and gastrointestinal organ systems became evident over the years, spanning from 2013 to 2022. Conversely, we observed an increasing trend in infectious disease cases. Furthermore, there was an upward trajectory in injury (trauma) cases from

2013 to 2018, followed by a declining trend from 2019 to 2022. Linear regression was performed in the yearly percentages for the primary organ system causes of repatriation to ascertain which of these trends are significant (Fig. 9). Among the organ systems presented, the cardiovascular system showed significant trend results (Slope:  $-0.7827$ ; 95% confidence interval:  $-1.381$  to  $-0.1849$ ; p value: 0.0166).



**Figure 9.** Proportion of repatriation cases for each year for injury (trauma) (A), musculoskeletal (B), gastrointestinal (C), cardiovascular (D), infectious (E), genitourinary (F). The broken lines represent the trend line for the 10 year period

### YEARLY PERCENTAGE OF REPATRIATION CASES BY INDIVIDUAL DISEASES

To have a more granular understanding, we delved into the annual trends in repatriation cases for individual diseases spanning 2013 to 2022. We calculated each disease's share of the total repatriation cases for each year, thereby revealing the percentage of yearly cases attributed to specific diseases. These insights are graphically depicted in Figure 10, presented as a heatmap.

Within the realm of cardiovascular diseases, a consistent decline in the percentage of cases associated with chest pain, coronary artery disease, myocardial infarction, and ischaemic heart disease was observed over the study period (Fig. 10D). Turning to gastrointestinal cases, there was a reduction in the proportion of cholelithiasis/cholecystitis and haemorrhoids among the yearly repatriation cases. Conversely, there was an increase in the percentage of cases related to abdominal or pelvic pain (Fig. 10E). In the musculoskeletal category, we noted a decrease in the percentage of cases involving gout, accompanied by a rise in the percentage of cases associated with low back pain within the yearly repatriation statistics (Fig. 10B). Notably, the infectious disease category saw a visible surge in the proportion of COVID-19 cases among the yearly repatriation figures starting in 2020 (Fig. 10E). For genitourinary cases, the yearly repatriation data observed a significant

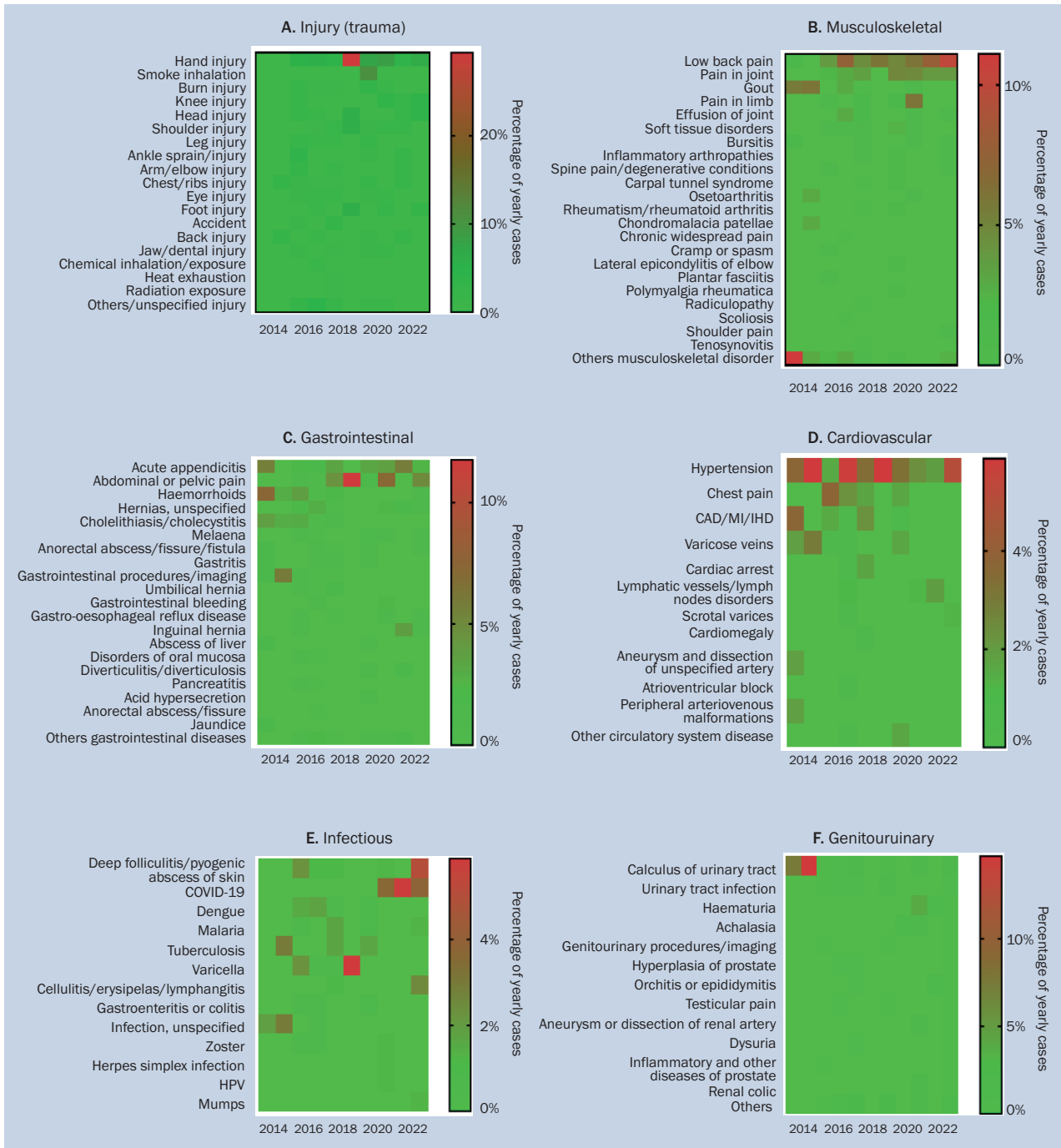
decrease in the percentage of cases attributed to calculus of the urinary tract (Fig. 10F). Further details on other cases can be found in Supplementary Table 3 (see journal website).

### DISCUSSION

The present study focused on analysing the repatriation cases among Filipino seafarers employed by OSM Maritime shipping company over a 10-year period (from 2013 to 2022). Our findings revealed that injuries/trauma, musculoskeletal, gastrointestinal, cardiovascular, infectious, and genitourinary conditions were the most common causes of repatriation. There is evidence for the decrease in the proportion of gastrointestinal, cardiovascular, and genitourinary conditions in yearly repatriation cases.

This study underscored the prominence of injuries and musculoskeletal conditions among repatriation cases. These conditions collectively accounted for over a third of the total repatriation cases, emphasizing their substantial impact on the seafaring community. Our findings agree with previous reports that injuries contribute a significant proportion to repatriation cases [9, 10]. Most of the injuries or musculoskeletal cases in this study were hand injuries, low back pain, and joint pains, which may signify occupational-related causes. Equally concerning were injuries stemming from smoke inhalation, burns, and radiation. This





**Figure 10.** Heatmap depicting the percentage of specific diseases in the yearly repatriation cases. The colour represents the percentage in the yearly repatriation cases, with red representing a higher percentage and green a lower percentage; **A.** Injury; **B.** Musculoskeletal; **C.** Gastrointestinal; **D.** Cardiovascular; **E.** Infectious; **F.** Genitourinary; CAD/MI/IHD – coronary artery disease/myocardial infarction/ischaemic heart disease; COVID-19 – coronavirus disease 2019; HPV – human papilloma virus

observation underscores the need to prioritise establishing a safe and secure working environment for seafarers. Measures such as stringent safety protocols, ergonomic improvements, and comprehensive training programmes may help reduce the incidence of injuries and musculoskeletal disorders, ultimately safeguarding the physical well-being of seafaring personnel [11].

COVID-19 cases constituted a significant share of infectious disease cases, reflecting the profound impact of this global public health emergency. The World Health Organization officially declared COVID-19 a pandemic in March 2020, triggering far-reaching consequences across various industries, with the maritime and shipping sectors bearing substantial challenges and disruptions



[12]. While effective public health measures, including quarantines and extensive vaccination efforts, have successfully contained the spread of COVID-19, it remains imperative to maintain a high level of vigilance [13, 14]. This ongoing vigilance involves continuously monitoring individuals presenting symptoms suggestive of COVID-19, use of face masks when appropriate, and updating vaccination of personnels [15]. These measures continue to be relevant in preventing the transmission not just of COVID-19, but other infectious diseases as well. The study's results also revealed many skin infections among seafarers, implying the need to improve hygiene conditions in their working environment [16].

The results showed evidence for decreased proportion of cardiovascular condition, gastrointestinal diseases, and genitourinary conditions in the yearly repatriation cases. Upon closer examination, this decrease was particularly evident in ischaemic heart conditions, cholelithiasis, cholecystitis, and calculus of the urinary tract. Several factors could be attributed to this decline. Notably, these conditions are significantly influenced by lifestyle factors and dietary habits and are preventable through proper disease screening [17–19]. Consequently, proactive health measures hold the potential to mitigate these conditions. The implementation of a holistic healthcare programme by the Nordic Medical Clinic (NMC) emerges as a potential contributing factor to this observed trend.

The NMC is a pre-employment clinic that caters to the seafarers of OSM Maritime Shipping Company in the Philippines. In 2018, NMC initiated a holistic health initiative for its seafarers. Holistic health the comprehensive patient care that considers interdisciplinary or multidimensional aspects of wellness [20]. This concept encourages looking at people as a whole, not merely focusing on physical well-being or the absence of disease.

In this regard, NMC implemented the following measures in order to provide holistic care to its seafarer clients:

- Holistic health app – a free-access online application shared to all seafarers upon booking of appointment for pre-employment medical examination (PEME). This consists of 9 modules covering the following: mindfulness, sleep, hydration, activities, reproductive health, safety, mental health, spiritual health, power morning drink;
- Feedback call from NMC doctor – 1 on 1 discussion with NMC doctor regarding PEME medical results and how to improve overall health, especially if with borderline findings (e.g. HbA1c on prediabetes level);
- Holistic health booklet for seafarers – self-explanatory educational material touching on the basics of health, common findings among seafarers, guide on better nutrition, exercise regimen, losing weight, getting quality sleep, and managing stress. A last few pages of the

holistic health booklet have been allotted to encourage seafarers to track their wellbeing and condition. This promotes the behaviour that seafarers can be active participants in health decisions and their healing process;

- Company health talks – monthly or quarterly health talks for partner companies of NMC tackling topics like seasonal diseases, stress management, trimming obesity, and many more. Additionally, NMC physicians participate in the Pre-Departure Orientation Seminar (PDOS) of seafarers emphasizing the role and importance of health on safety on board;
- Vessel visits by NMC employees – learning about seafarers' everyday routines and working conditions at sea provides NMC perspective on how to improve the health care approach for seafarers;
- Comprehensive testing – inclusion of electrocardiogram, lipid profile, ultrasound, treadmill stress test based on clinical assessment for necessity in order to check the most commonly incurred lifestyle-related conditions. This aids to provide early recognition, control and management through medications and assertion of dietary or lifestyle changes prior to being deemed fit for sea duty

Moreover, NMC also implemented risk-based assessment that properly guides the screening and treatment of seafarers [21]. While the decrease in the proportion of cardiovascular cases and screenable gastrointestinal and genitourinary conditions may be attributed to the holistic care implemented by NMC, further research is required to confirm the effectiveness of NMC's holistic care approach.

## CONCLUSIONS

This comprehensive analysis of medical repatriation cases among Filipino seafarers employed by OSM shipping company from 2013 to 2022 has highlighted the predominant causes of repatriation, with injuries/trauma and musculoskeletal conditions emerging as the most prevalent factors. Gastrointestinal, cardiovascular, infectious, and genitourinary conditions also constituted a significant proportion of the cases. Notably, our results indicate a declining trend in the proportion of cardiovascular, gastrointestinal, and genitourinary conditions in the annual repatriation cases.

Our study underscores the imperative for multisectoral collaboration to enhance the health and well-being of seafarers. Policymakers, maritime shipping companies, medical clinics, and other stakeholders should prioritize implementing comprehensive care programmes for seafarers, ensuring safe and clean working conditions to prevent injuries, and reduce the incidence of diseases. Holistic care programmes, such as those employed by the NMC, hold promise and should be further explored for their potential to enhance seafarers' health. Additionally, continuous monitoring and evaluation of repatriation cases and fur-

ther research into effective interventions, timely actions, and program implementations are essential to improving seafarers' occupational health and overall well-being. By investing in the health and welfare of seafarers, we can bolster the maritime industry's sustainability and resilience while safeguarding its workforce's holistic well-being.

**Conflict of interest:** None declared

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