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Medical evacuations from offshore oil and gas installations – an exploratory scoping review

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REVIEW ARTICLE

Medical evacuations from offshore oil and gas installations — an exploratory scoping review

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ABSTRACT

Background: *Medical evacuations (MEDEVACs) from offshore installations are both costly and disruptive. Enhancing worker well-being may help reduce evacuations due to illness or injury, thereby maintaining the smooth operation of offshore activities and lowering financial burdens.*

Objectives: *This scoping review aims to identify whether illness or injury is the predominant cause of MEDEVACs from offshore oil and gas installations and to determine the most common types of illnesses or injuries involved. Additionally, the review outlines a future research agenda focusing on offshore worker health and well-being.*

Materials and methods: *A comprehensive structured search was conducted across the Scopus, PubMed, and Web of Science databases, as well as through reference lists and grey literature. Studies were included if they addressed MEDEVACs from offshore oil and gas installations. Eleven articles met the inclusion criteria.*

Results: *Articles indicate that non-occupational illnesses are more frequent causes of MEDEVACs than injuries. Among these, chest pain, cardiovascular issues, and dental problems were disproportionately represented. Contractor personnel were more likely to*

require evacuation than company employees. Additionally, younger workers were more likely to be evacuated due to injuries. Chronic health conditions were more common reasons for MEDEVACs among older workers. The review highlights the significant role of non-communicable diseases in contributing to MEDEVACs, as opposed to occupational exposures.

Conclusions: *Investing in preventive health management, targeted research, and workforce education may substantially reduce the prevalence of non-communicable diseases in the offshore environment, lowering MEDEVAC rates, associated costs, and operational disruptions. Further investigation into the underlying causes of ill health among offshore workers is needed to enhance overall workforce well-being.*

Keywords: medical evacuation, MEDEVAC, oil and gas, occupational health, worker well-being

INTRODUCTION

Offshore oil and gas installations are found in more than 50 countries, in 2015 they contributed 30% of global crude oil production, producing more than 27 million barrels of oil per year [1]. A number of workers are employed in the offshore oil and gas sector; working day and night, year-round, in remote locations, and often challenging conditions [2]. In the UK in 2021 alone, some 11200 people worked offshore in oil and gas production [3], a modest proportion of the global offshore workforce.

Offshore oil and gas installations offer a unique working environment, presenting the industrial and occupational health hazards normally found in high-risk chemical industries onshore, with the additional challenges presented by being in an offshore setting, challenges such as isolation, harsh conditions, and logistical difficulties [4]. While the health challenges workers face are similar to those working onshore, their remoteness from secondary or tertiary health resources and the challenges of patient transport means that accessing medical treatment poses challenges not normally encountered onshore [2]. This may mean that a relatively minor health issue onshore may be a significant issue for an offshore worker. Although offshore installations typically maintain staffed and well-equipped clinics, those clinics are intended to treat minor ailments or emergency cases. In emergency cases, the medic may provide care to stabilize the patient until evacuation can occur. Even if the medic can stabilize the patient evacuation can be significantly delayed due to resource availability or adverse, preventing helicopter operations [2]. Clinics are not for the long-term care of

patients, and minor ailments may necessitate that the patient is transferred to shore by helicopter for further (even if minor) treatment. Equally, personnel suffering from minor ailments or illness who cannot work may be returned to shore to release bed space, which is always in high demand and short supply [5].

Medical evacuations (MEDEVACs) may be classified as “routine” or “emergency” [6]. The distinction between the categories is that an emergency medical evacuation would be carried out using either a state-funded search and rescue helicopter or a designated MEDEVAC helicopter maintained by the operating company, distinct from a crew transport helicopter. Routine medical evacuations would be where the patient has a minor ailment and is transported by the next scheduled helicopter. A third possible category that may be largely unrecognized is the return to shore of workers on medical grounds near the scheduled end of their offshore rotation. In such instances, they may be moved to an earlier flight. This way, the person is returned to shore on medical grounds but may fall outside any medical reporting system as they would be moved within the flight booking system. Regardless of the method employed, any form of medical evacuation results in the premature disembarkation from the installation and should be avoided whenever possible.

Medical evacuations are not without risks for helicopter crews, patients, and offshore installations [7, 8]. They can be costly, not only in terms of the transportation of the patient but also in terms of lost work time, lost opportunity costs, administration and medical costs. Furthermore, it can disrupt work being carried out on installations and divert national resources depending on where the installation is located [5]. As such, medical evacuations need to be reduced to a level as low as reasonably practicable to reduce unnecessary or untimely patient evacuation to shore for medical assessment and treatment [9].

Beyond the economic issues associated with medical evacuations, analysis is required to understand the underlying health issues that necessitate medical evacuations in the first place. Such analysis should include investigating the prevalence of injuries, chronic diseases, access to healthcare resources, working conditions, and the constraints or norms that may affect the health condition of offshore workers. By identifying such issues, targeted interventions to improve health outcomes may be developed.

This review seeks to map the breadth and scope of current research concerning medical evacuations from offshore oil and gas installations, to determine whether illness or injury is the predominant reason for medical evacuation, and which forms of illness or injury predominate. Such mapping is crucial for policy decisions, helping to determine management priorities and effective resource allocation. As an exploratory scoping review, it identifies

research gaps that may shape a future research agenda. A further aim is to determine if any research has been carried out focusing on oil and gas operations in the Danish sector of the North Sea.

MATERIALS AND METHODS

SEARCH PROTOCOL

This scoping review was undertaken, applying the processes defined by Arksey and O'Malley [10]. The scoping review protocol was registered with the Open Science Foundation. The Condition, Context, and Population (COCOPOP) framework was used to define the inclusion and exclusion criteria for article screening, as outlined in Table 1 [11]. The database search was carried out in September 2024. No limits were placed on publication dates. The searches were limited to articles published in English.

SEARCH STRATEGY

After defining the inclusion and exclusion criteria, search terms were determined. A search string was developed and tested in the PubMed database, it was deemed suitable when it produced consistent results, effectively retrieving relevant literature specific to the topic of interest. Furthermore, the search string was required to return key studies and reviews that aligned with the research objectives of the review, thereby ensuring effective coverage of the subject.

The final search string was translated using Polyglot Search Translator [12] and applied to the Scopus and Web of Science databases. The search strings employed are reproduced in Table 2.

A review of references in the articles returned from the searches, and from articles previously identified was carried out using the Connected Papers website (https://www.connectedpapers.com/). One additional article was identified in this manner: Gibson Smith K, Paudyal V, Klein S, Stewart D. Medical evacuations and work absences in offshore oil and gas industry personnel. Self-care. 2019 Oct 31;10(4):105–115.

A search of grey literature was also carried out using the Google search engine. Employing the search: Medical evacuation* OR MEDEVAC AND offshore AND oil AND gas filetype:pdf. The search was limited to "filetype:pdf" to narrow the search to reports, white papers and similar articles.

One article was found for inclusion: Offshore Energies UK (OEUK). Health, Safety and Environmental (HS&E) Report 2023: Health, Safety and Environmental Reporting for the UK's Offshore Energy Industry. United Kingdom: Offshore Energies UK; 2023 [13].

Previous annual reports in the same series were used for background information, though not included in the scoping review to limit the sources to a manageable quantity. This approach ensured a focused analysis while providing relevant context from established literature.

SCREENING AND SELECTION

The results of the searches were assessed using Covidence software [14]. Duplicate articles were automatically removed in this process. Articles were screened for inclusion based on an initial assessment of the title and abstract. Where the title and abstract indicated that an article was likely to fulfil the inclusion criteria, the full text was reviewed. Due to the exploratory nature of this review, only one reviewer was required.

The results of the screening process are shown in Figure 1.

RESULTS

After the screening and selection process, 11 documents were selected for inclusion in the scoping review. The included articles are listed in Table 1.

The key findings of the articles included in this review are summarized in Table 4. In all cases, the studies were conducted exclusively among populations of offshore oil and gas workers.

RISK OF BIAS WITHIN STUDIES

Bias within individual studies was assessed and found not to have any adverse effect on the results of this review. Given that the primary focus of this review is to understand the scope of existing research concerning medical evacuations, sources of bias have minimal impact on the results of this review.

STUDY CHARACTERISTICS

A summary of study characteristics is presented in Error: Reference source not found. The articles reviewed were published between 1988 and 2023, in either a North Sea setting [13, 15–17], Thailand [18], Brazil [19] or in the Gulf Coast of the United States [20, 21]. While the studies by Gibson Smith et al. [22] and Ponsonby et al. [2] were not restricted to one location. No articles were identified that specifically addressed oil and gas operations in the Danish sector of the North Sea. However, the results obtained offer generalizable insights applicable to offshore environments.

All of the studies included in the review, except those by Ballantine et al. [23] and Duffy et al. [15], made some assessment of the differences in the number of evacuations due to illness or injury. Both research groups specifically investigated health and evacuation issues related

to dental health among offshore workers and were therefore not concerned with other causes of MEDEVACs.

Norman et al. [24] identified a changing trend in this ratio of evacuations caused by injury or illness. At the start of their study, illness accounted for 25% of MEDEVACs, in subsequent years of the study, this situation altered, illness, and injury MEDEVACs became approximately balanced by 1984 (the end of their study).

Thibodaux et al. [25] found non-occupational illness and injury accounted for 77% of MEDEVACs, with occupational illness injuries accounting for the remaining 23%. Chest pain was identified as the most frequent reason for MEDEVACs accounting for 26% of all MEDEVACs. Cardiovascular issues were significantly represented in the study of Thibodaux et al. [21], they did not feature prominently in the findings of Norman et al. [24], whose study found 41 cases were evacuated for cardiac health issues, which amounted to 1.89% of all MEDEVACs in the study period. This picture changed in the intervening years, with statistics from OEUK [13] indicating that in the UK sector of the North Sea, cardiac health issues accounted for 27% of medical evacuations in 2023, furthermore, the report outlines that there were 337 MEDEVACs carried out in 2022, the number of MEDEVACs having doubled since 2017. The primary causes for MEDEVACs and their relative prevalence in offshore settings were examined and are shown in Error: Reference source not found.

Similarly to chest pain and cardiac issues, the impact of avoidable dental issues on MEDEVAC rates is significant. Norman et al. [17], found that disorders of the digestive system were the most prevalent type of illness leading to medical evacuation 239 evacuations (39.2% of all illness-related MEDEVACs), of this category, approximately half (115) were dental issues, 5% of all MEDEVACs. Gibson Smith et al. [22] found dental issues accounted for 11.4% of MEDEVACs, Ponsonby et al. [2] 15%.

Dental issues and cardiac health issues are of significance in the context of offshore oil and gas production because they are not only non-communicable health issues that can be largely managed or avoided through lifestyle modification and timely health intervention; many non-communicable diseases are also associated with high mortality rates [26].

Regarding occupational injuries resulting in MEDEVAC, Norman et at. [24] found that suspected fractures were the most numerous cause — 442 cases (20%). This figure was mirrored by Ponsonby et al. (29%), and Waje-Andreassen et al. [27] (18%). Only Sae-jia et al. [18] found a significantly lower level of MEDEVACS due to fractures at 4.09%.

According to Norman et al. [17] eye and hand injuries were numerous, accounting for 25% of all evacuations, with eye injuries alone accounting for 10%. Thibodaux et al. [25], found a

much lower percentage of 3.77% for eye injuries, these disparities may be explained by changes in offshore health and safety practices such as mandatory use of protective glasses, introduced in the period between the two studies.

Few of the studies reported the age of workers sent ashore by MEDEVAC. Norman et al. [24], reported that the mean age of MEDEVAC patients was 28.3 years for injury cases and 34.4 years due to illness. Thibodaux et al. [25], illustrated trends related to age, injury and MEDEVAC showing a direct relationship between age, injury, and illness; older workers primarily returning to shore for illness, and younger workers for injury.

Contractors accounted for 90.6% of MEDEVACS in the study by Norman et al [24]. Ballantine et al. [23], found that contractors were at the highest risk of dental issues. 19% of short-term contractors fell into the highest dental risk category compared to 11% of operating company employees.

None of the papers reviewed linked the phase of operation with illnesses, injuries, or medical evacuations, i.e., whether the offshore platform is in a construction, operation, or decommissioning phase.

A notable finding from Norman et al. [24], was that, of the MEDEVACs carried out, only 4% required immediate hospital admission.

DISCUSSION

This review aimed to determine the main reasons for medical evacuations (MEDEVACs) from offshore oil and gas installations and to understand the primary causes of these evacuations. It included 11 articles. A narrative discussion of the study findings is presented.

The number of research articles returned from the searches was limited, though their contents provided valuable insights into the causes of MEDEVACs. Many of the studies are dated, and this may reduce their relevance in contemporary contexts, care must therefore be taken when applying their findings. The number of peer-reviewed studies identified in this review is relatively small considering the number of offshore workers. The range of the populations studied was limited, potentially limiting the generalizability of the findings, yet still suggestive of prevailing trends.

The studies reviewed generally indicate a change in MEDEVAC trends. Where injury-related evacuations were once predominant [24], more recent reports indicate that non-occupational illnesses now account for a greater proportion of MEDEVACs [23, 24, 28]. Excluding the articles that focused on dentistry [15, 16], all but one of the studies [22] concluded that illnesses prevail over injury as the prime cause of premature disembarkation.

The trend of increased illness over injury is similarly reflected in grey literature and conference papers [29–31] though this may vary depending on several factors, including the platform's operational phase, local conditions, reporting requirements, and workforce demographics.

Gibson Smith et al. [22], described that their study design may have contributed to their divergent outcome — concluding that injury is a more significant cause of medical evacuation than illness. The study design required participants to report MEDEVACs from any point in their career offshore, which, as the authors note, could account for a considerable period; potentially decades and again this may not be reflective of current issues offshore. One significant point made by Gibson Smith et al. [22] is that the absence of workers on health grounds is predictive of MEDEVACs to some extent. Personnel who are absent from the workplace based on health-related issues appear to be significantly associated with subsequent medical evacuation. This may help with predictive modelling for the likelihood of offshore workers requiring MEDEVACs during their careers.

Improvements in safety management, risk recognition, and offshore health provision, as well as developments in technology, have all contributed to changing trends in incident and accident rates, as well as the prevalence and effects of illness offshore [32]. Offshore injuries have declined in both number and severity since the earlier studies reviewed [29]. The data presented by Norman et al. [24] presents a list of injuries which required MEDEVAC, the quantity of such severe injuries may not be reflective of the current offshore safety approaches, and may be unreliable in the contemporary offshore setting.

Gibson Smith et al. [22] noted a female population of 3.7% in their cross-sectional survey. The industry body Oil and Gas UK, reports that over the last 10 years, the proportion of female workers offshore (in the UK sector) has not changed significantly [33] and is approximately 3.5% — in line with Gibson Smith et al. [22]. The exposure of those female workers to injury offshore may vary subject to their occupation. Although women are not restricted in their job roles, many work in catering, housekeeping, medical, or support operations. Catering roles expose workers to significant risk of injury including slips, trips, falls, musculoskeletal issues, burns, and mechanical injuries. The relationship between female job roles and premature MEDEVACs is an area which should be considered for future research.

From the studies, there are trends regarding the type of illness and injury for which MEDEVACs are required. Where the type of illness or injury was discussed in the studies selected [17, 18, 20, 21, 27] the results were classified differently, meaning that direct

comparisons were not always possible. Meta-analysis from these studies was therefore not feasible; however, a generalised picture of MEDEVAC trends was possible.

Norman et al. [24] found that digestive and dental issues were the predominant cause of MEDEVACs from offshore installations. Of 790 illness-related MEDEVACs, 239 (39.2%) were for digestive disorders (which also included dental issues), and dental issues accounted for approximately half of those evacuations (112 MEDEVACs). Ballantine et al. [23], noted the generally better dental health among company employees, people in management positions and those with higher levels of education [23] when compared to contractor personnel. This may be significant for targeting health education efforts to workers, particularly contractors. Given the age of the study, caution should be used in interpreting its validity in the contemporary setting; however, there is sufficient evidence in the included articles to determine that dental issues among offshore workers remain a significant cause for MEDEVACs.

Cardiac health issues leading to MEDEVACs are reported as 5.2% of all MEDEVACs by Norman et al. [24]. Chest pain in the study of Thibodaux et al. [25] accounted for 45% of MEDEVACs, with 21% of chest pain MEDEVACs being due to myocardial infarction, coronary stent placement, coronary bypass surgery or unstable angina; a total of 9.44% of the study population. Norman et al. [24], found 1.26% of all evacuations were related to myocardial infarction or ischaemia, other sources also point to similar levels of cardiac health issues [29–31]. Differences between the two studies may be due to demographics, reporting, changes in treatment, or other factors. The 20-year difference between the studies, and the effects of political geography may also factor significantly in this difference. It should also be borne in mind that there may have been differences in fitness to work criteria between the study populations, which, may have imparted effect. Oil and Gas UK reported in 2019 [34] that emergency medical evacuations from offshore installations were required 241 times, 21% of these MEDEVACs were for cardiac health issues this figure rose to 27% in 2023 [13]. Cardiac health issues therefore present the highest single cause of illness-related MEDEVACs in the UK offshore sector. These conditions often necessitate longer recovery periods for workers, with some being unable to return to work offshore. Cardiac health issues can lead to premature departure from the industry and pose a heightened risk of death while offshore. Medical transportation for psychological ill health accounted for 1.9% of the evacuations studied by Norman et al. [24]. According to OEUK [13], year-on-year evacuations for mental health-related issues in the UK sector of the North Sea have remained relatively stable, accounting for approximately 2.5% of medical evacuations since 2017. There may be

significant underreporting of MEDEVACs for psychological issues [35]. Reasons such as perceived stigmatization may contribute to psychological issues not being openly reported [36]. Personnel may also return to shore with psychological issues without them ever being recorded. They may wait until the end of an offshore trip and then report sick, deciding not to return for their next rotation. This would therefore not be classified as a MEDEVAC but could potentially skew overall health statistics and undermine the understanding of mental health challenges in offshore environments.

Riethmeister et al. [35], noted that the absence rate on health grounds among offshore populations is generally low, but also that this was not reflective of the health status of the workforce as a whole. Machismo, stoicism and other masculine behavioural norms are common in male-dominated workforces [36] potentially meaning offshore workers may report for work despite being ill. These behaviours may add to the potential for MEDEVACs. While legally workers and companies must report injuries, workers may choose not to report illness. They may choose to wait until the point where it is perceived to be worthy of reporting [36]. Reithmeister et al. [35], also report that 67% of offshore workers reported living with chronic health issues, primarily musculoskeletal issues or cardiovascular issues and that 44% of those reporting chronic illness had to adapt their work to take account of their health issue (e.g. working more slowly). Health policies and education to strengthen open and honest health cultures offshore may reduce MEDEVAC rates.

The age of workers and medical evacuation appears to be linked to both the reason for, and the number of medical evacuations. Younger workers appear to be more likely to undergo MEDEVAC due to injury, while older workers appear more likely to be evacuated due to illness.

The correlation between age and medical transport was similarly noted in the study of Norman et al. [24], however, Norman et al. found that in the over 55 age group illness and injury evacuations were approximately equal. This despite significant differences in illness and injury evacuation rates for all age groups up to 45 years of age where injury was the predominant cause. Such findings may be accounted for by improvements in safety procedures and processes since the study of Norman et al. [24] that have led to an overall reduction in injury rates [32].

Older workers may be subject to fewer injuries as experience has taught them how to carry out tasks safely [24], they may act in supervisory roles to younger workers (even if in an unofficial capacity), or in an administrative or leadership role, resulting in a disproportionately high injury exposure for younger workers. Commonly the higher the job

level of the worker in the offshore hierarchy, the lower the prevalence of both illness and injury reported [37]. Associations between job level, illness and injury were not possible to conclude from the included studies.

While included articles indicate that those over 45 years of age have fewer MEDEVACs for both illness and injury compared to younger workers [24, 25]. Data from the UK Health and Safety Executive [38], shows that sickbay visits offshore for illness for the 45–49.9 age group, are disproportionately high when compared to their representation in the offshore population.

After 50 years of age the number of sickbay visits for illness fell considerably. This may indicate a healthy worker effect where workers with illness cannot obtain a fitness-to-work certificate, excluding them from working offshore. Alternatively, the demands of working offshore may be incompatible with the health status of the worker, and they may elect to stop working offshore. The reasons behind workers failing offshore fitness-to-work examinations should be researched as this may also reveal important health trends in offshore populations. Modern sedentary lifestyles and the obesogenic [39] nature of offshore oil and gas installations may aid the development of some non-communicable diseases. A report from Oil and Gas UK [40] found that the weight of male offshore workers had increased by 19% between 1985 and 2009. Kuovenen et al. [41] found that increasing worker obesity rates could be correlated to an increase in injury rates. Upstream health interventions may reduce the prevalence of obesity and non-communicable diseases [42], and potentially may alter MEDEVAC rates for both illness and injury.

Dental pathologies offer an area of difficulty for offshore workers and offshore medics. The offshore treatment of dental issues is beyond the scope of many medics and available facilities, therefore rendering pain management and MEDEVAC the only viable options. The costs of dental care and access to that care can also be prohibitive for workers. Upstream health education and a holistic health management approach may significantly reduce MEDEVAC costs for dental reasons and be of benefit to worker health. The use of dental insurance and company dental schemes may be beneficial; however, such schemes would need to be extended to or implemented by contracting companies to be truly beneficial.
The job role of evacuees was not recorded in the reviewed studies. The nature of the work that an evacuee undertakes will determine their workplace exposures — not all offshore workers are equally exposed; maintenance, construction, and drilling workers offshore are more susceptible to injury than many other offshore workers [29]. The studies included in this review indicate that contractors are more likely to be evacuated to shore for both injury and

illness. This may be not only due to exposure but also due to the generally higher population of contractors offshore compared to employed workers [32].

None of the papers reviewed highlighted either the nature of the installation (whether an FPSO, a fixed installation or a drilling rig) or the phase of operations when medical evacuations occurred. Norman et al. [24] did discuss the changes in injury types from the construction phase to the operating phase, but this is not explicitly reflected in the study data. Thibodaux et al. [25] alluded to amputations and upper extremity injuries stating that such injuries are more likely during drilling and construction phases, though the study does not explicitly link evacuation data with either installation type or operational phase. As such it is difficult to conclude if the number of MEDEVACs is proportional to the drilling and construction operations carried out, or if the installation type has any effect, though it remains likely.

LIMITATIONS OF THE STUDY

The review focused on those published peer review studies available in English, which may have excluded some potentially valuable research. Literature in this area of research is limited, with differences in categorization and recording of data making direct comparisons across articles difficult, however, this review intends to identify the research available, not to conduct meta-analysis. The age of some studies questions the applicability of earlier studies in contemporary settings.

CONCLUSIONS

This review revealed that illness is typically the primary cause of medical evacuation from offshore oil and gas installations.

This review identified a limited number peer-reviewed studies regarding medical evacuations from offshore installations. It was possible to draw sufficient information from the studies to fulfil the stated aims. This review identifies that non-occupational illnesses are the primary reason for MEDEVACs and that non-communicable diseases predominate; with dental and cardiovascular issues contributing significantly to medical evacuation numbers.

In the short term, there is a pressing need for robust, methodologically sound research to accurately assess the status of medical evacuations, injuries, and worker health on offshore platforms. Applying a recognized classification system, such as the WHO International Classification of Diseases (ICD), would facilitate more comparable reporting across studies.

Only by recording the experiences of a statistically valid number of offshore workers, using a structured classification system for illnesses and injuries can a clearer understanding of workplace conditions, and worker health be developed. This, in turn, could shed further light on the factors leading to premature disembarkation from offshore installations.

Links between worker role, age, health status, psychosocial factors, shift patterns, lifestyle choices and MEDEVACs should be further explored. Future research should consider longitudinal studies, which could provide insights into the development of chronic illnesses among workers and their impact on MEDEVAC rates.

Prioritizing upstream health education and interventions in the offshore environment is essential, fostering a positive health climate may lead to a reduction in MEDEVACs due to illness, research into this area is recommended. A holistic health approach covering recruitment, diet, fitness, exercise, ergonomics, and psychosocial aspects should be favoured above reliance on fitness-to-work screening.

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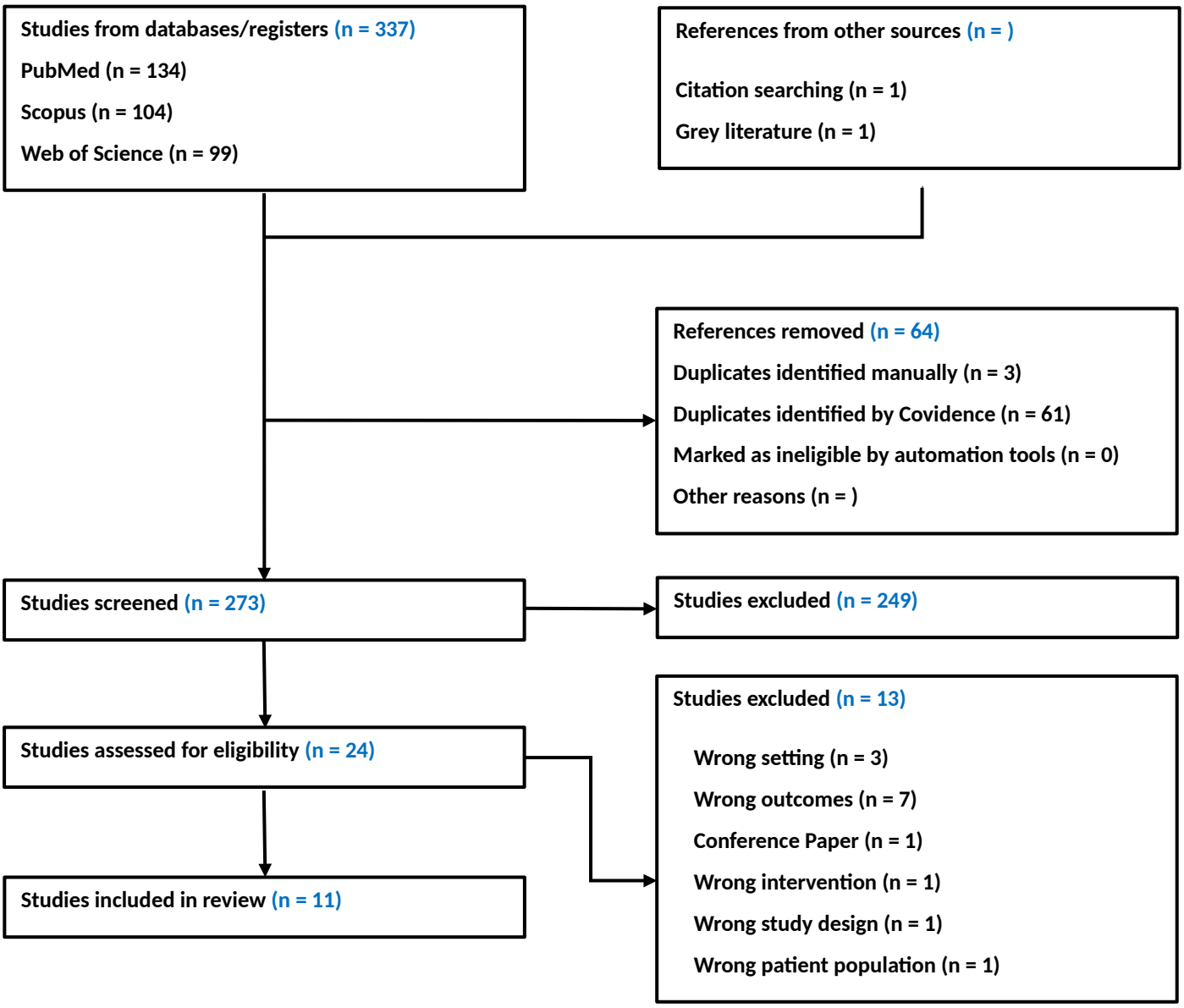

Figure 1. PRISMA diagram for the article selection process

Table 1. Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Condition	Medical evacuation (illness or injury)	Military medical evacuations
	Aeromedical evacuation (MEDEVAC/MEDIVAC*)	Evacuations related to combat or military operations
	Casualty evacuation (CASEVAC)	Mountain rescue
	Helicopter evacuation (offshore)	Routine transport without urgency or remote challenges
	Dental emergencies	
	Patient transport (urgent, non-routine)	
Context	Offshore oil and gas personnel (fixed/mobile platforms, FPSOs)	Seafarers (merchant ships, non-oil and gas workers)
	Remote locations requiring specialised medical transport (e.g., long distances, harsh conditions)	Windfarm workers or similar with easier access to medical facilities
	Helicopter or specialised transport due to remoteness or lack of onshore care	Military personnel in combat or non-civilian operations
Population	Offshore oil and gas workers (e.g., rigs, FPSOs)	Seafarers (merchant navy, fishing vessels)
	Personnel in remote offshore facilities with limited medical infrastructure	Windfarm or land-based workers
		Military personnel
Design	Quantitative studies	Review articles
	English language	Non-English language

*MEDIVAC is a less commonly used variant of MEDEVAC

Table 2. Search strings used

Source	n	Search string
PubMed	(134)	[("offshore") AND ("medical evacuation" OR "emergency medical care" OR "medical care" OR “MEDEVAC” OR “MEDIVAC” OR "injuries" OR "illness" OR "telemedicine" OR "self-care" OR "behaviour change interventions")]
Scopus	(104)	TITLE-ABS-KEY (offshore) AND (medical AND evacuation OR emergency AND medical AND care OR medical AND care OR medevac OR medivac OR injuries OR illness OR telemedicine OR self-care OR behaviour AND change)
Web of Science	(99)	TS = [(offshore) AND ("medical evacuation" OR "emergency medical care" OR “MEDEVAC” OR “MEDIVAC” OR "medical care" OR "workplace injuries" OR illness OR telemedicine OR self-care OR "behaviour change interventions")]

MEDEVAC — medical evacuation

Table 1. Articles included in the scoping review

Primary author	Year	Title
Ballantine, B.N. [15]	1990	A Survey of The Dental Health of the Workers On 2 Groups of Offshore Installations
Benevides, A. G. M. [16]	2023	Offshore Medical Evacuations Due to Non-Occupational Illnesses
Duffy, B. [17]	1996	Dental Problems in the Offshore Oil and Gas Industry: A Review
Gibson Smith K. [18]	2019	Medical Evacuations and Work Absences in Offshore Oil and Gas Industry Personnel
Norman, J.N. [19]	1988	Medical Evacuations from Offshore Structures
OEUK [13]	2023	Health, Safety and Environmental (HS&E) Report 2023: Health, Safety and Environmental Reporting for The UK's Offshore Energy Industry.
Ponsonby, W. [2]	2009	Offshore Industry: Medical Emergency Response in the Offshore Oil and Gas Industry
Sae-jia, T. [20]	2020	Medical Evacuations Among Offshore Oil and Gas Industries in The Gulf of Thailand
Taylor, D.H. [21]	1993	Air Medical Transport of Patients from Offshore Oil and Gas Facilities. Historical Accident Data and Initial Experience
Thibodaux, D.P. [22]	2014	Medical Evacuations from Oil Rigs Off the Gulf Coast of The United States From 2008 To 2012 Reasons and Cost Implications

Waje-Andreassen, A. [23]	2020	A Prospective Observational Study of Why People Are Medically Evacuated from Offshore Installations in The North Sea

Table 4 Study characteristics

Primary Author	Year	Study Design	Location	Key Findings
Ballantine, B.N. [15]	1990	Dental examinations	UK North Sea	Dental issues are significant among offshore workers. 8% evacuated for dental reasons; 36% in high-risk groups.
Benevides, A. G. M. [16]	2023	Database analysis	Brazil	Non-occupational illnesses were found to be the primary cause of evacuations at 86.6%.
Duffy, B. [17]	1996	Database analysis	UK North Sea	Dental pathology is a significant issue in offshore workers.
Gibson Smith K. [18]	X	Cross-sectional survey	Global	Medical evacuations primarily result from injuries. Short-term illnesses contribute to medical evacuations. Dental problems account for many illness-related medevacs.
Norman, J.N. [19]	1988	Analysis of offshore evacuation data	UK North Sea	The majority of evacuations were due to illness, especially dental issues. Age influenced evacuation reasons: older evacuees had more illnesses.
OEUK [13]	2023	Annual report	UK North Sea	In 2022, 337 MEDEVACs were conducted. Medevac rates doubled in five years. Cardiac incidents were the leading cause of medevacs 27%.
Ponsonby, W. [2]	2009	Analysis of offshore evacuation data	Global	55% of all evacuations were due to illness. Telemedicine enhances emergency care in remote locations.
Sae-jia, T. [24]	2020	Analysis of offshore evacuation data	Thailand	The majority of evacuations (84.13%) were due to illness. 40% of cases were preventable.
Taylor, D.H. [21]	1993	Analysis of offshore evacuation data	US Gulf Coast	Aeromedical transport is essential in offshore oil production for both illnesses and injuries.
Thibodaux, D.P. [22]	2014	Analysis of offshore evacuation	US Gulf Coast	The majority of evacuations were due to non-occupational illnesses. Heart disease is the leading chronic

		data		condition causing medevacs. The average evacuation cost is approximately $49250.
Waje-Andreassen, A. [23]	2020	Prospective observational study	Norway North Sea	Illness causes three times more evacuations than trauma. Cardiac issues are the most common reason for evacuation. Fridays and Saturdays are typically the busiest days for medevacs.

Table 5. Causes of illness-related evacuation, along with their reported prevalence from different sources

Cause of evacuation	Prevalence range (%)	Mean (%)	Sources
Dental issues	3.13–15	8.12	(2, 16–19, 24)
Cardiac health issues/Chest pains	1.9–45	19.6	(2, 13, 16, 19, 22, 23)