

Medical Evacuations From Oil Rigs off the Gulf Coast of the United States From 2008 to 2012

Reasons and Cost Implications

Donald P. Thibodaux, MD, Robert M. Bourgeois, MD, MPH, Ronald R. Loepcke, MD, MPH, Doris L. Konicki, MHS, Pamela A. Hymel, MD, MPH, and Marianne Dreger, MA

Objective: To identify reasons for air medical evacuations from oil rigs/platforms. **Methods:** Retrospective review of data of medical calls from 102 rigs/platforms in the US Gulf Coast from 2008 through 2012 with specific analysis of medevacs. **Results:** On average, 1609 total calls per year relating to illness or injury on the 102 oil rigs/platforms with 4% to 7% requiring medical air evacuation. On average, 77% of medevacs were for nonoccupational medical injury or illness. **Conclusions:** Illness, not occupational injuries, is identified as the major reason for medical evacuations from oil rigs. Heart disease is the leading cause of chronic health conditions resulting in a medevac.

Oil rigs are unique working environments situated in open water miles from cities or ports and land-based medical facilities. Most rigs and production platforms are equipped with medical personnel who are knowledgeable in first aid and who can provide basic medical care for the injured or ill worker. In addition, consultation with onshore physicians and medical personnel is also available via telemedicine, which has proven successful for the treatment of minor injuries and illness and the provision of primary care.¹⁻³

Nevertheless, when employees experience a serious injury or illness, they must be airlifted to a land-based medical facility. Although studies have focused on work-related injuries and illnesses encountered on oil rigs, few studies have addressed those injuries and illnesses that are severe enough to warrant medical evacuation (medevac) and the costs involved. Medical evacuation in and of itself offers challenges to the provision of medical services to critically ill or injured workers due to the remoteness of the facilities coupled with often-violent weather, mechanical problems, and/or other unplanned issues that can be dangerous and entail additional delays of hours to days and high costs to the company. Therefore, with the goal toward reducing the number of medevacs necessary, the precise reasons for these medevacs must be identified.

In this retrospective review of data from drilling rigs and production platforms in the US Gulf Coast from 2008 to 2012, we explore the reasons for emergent air medical evacuations (medevacs), specifically to address whether the illnesses/injuries requiring evacuation are the result of an occupational injury/accidents (falls,

Learning Objectives

- Identify the unique challenges of dealing with injuries and illness affecting workers on deep-water drilling rigs.
- Summarize the new retrospective findings on medical evacuations (medevacs) from Gulf of Mexico oil rigs, including the most common reasons for medevacs.
- Discuss the cost implications of oil rig medevacs and recommendations that may help to control those costs.

burns, blunt force trauma, etc) as commonly thought, or are due to a preexisting chronic illness (heart disease, etc) and review the costs involved.

BACKGROUND

Approximately 33 deep-water drilling rigs and more than 600 manned production platforms and 400 to 500 support vessels operate daily off the coast of the United States in the Gulf of Mexico (GOM). The total GOM workforce can range from 26,000 to 34,000 personnel per day. The yearly workforce is estimated to be twice this number (most oilfield workers rotate in 14-day shifts). This study was based upon approximately 102 drilling rigs and production platforms operated by 25 different companies. The average number of individuals on these 102 rigs and platforms on any given day is approximately 800, or one-quarter (1/4) of the total GOM workforce.

METHODS

For this retrospective review, data from all medical calls received during 2008 to 2012 from 102 participating drilling rigs and production platforms in the US Gulf Coast were analyzed specifically to identify those medical cases that required medevac. The data collected included age, the condition prompting the medevac—whether it was a medical condition or occupationally related, the facility or rig from which the employee was transferred, and the parent company of the rig. In addition, these companies were surveyed in late 2012 to determine whether preemployment screening was performed and if so, what type of screening was conducted and for what classes of employees. Companies were also asked whether health and wellness programs offered.

RESULTS/FINDINGS

From 2008 through 2012, there were, on average, 1609 calls per year relating to illness or injury on the 102 oil rigs and platforms located in the gulf region off the southern coast of the United States with between 4% and 7% of these calls necessitating the employee being medevaced to a land-based medical facility (Fig. 1).

An analysis of the data showed that, on average, 77% of medevacs were for nonoccupational injury or illness versus 23% for occupationally related injury or illness (Fig. 2). Table 1 lists the reasons for medical evacuation. The primary medical conditions necessitating

From Safety Management Systems (Dr Thibodaux), Lafayette; Bourgeois Medical Clinic (Dr Bourgeois), Morgan City, La; US Preventive Medicine, Inc (Dr Loepcke), Brentwood, Tenn; KDK Solutions, Ltd (Ms Konicki), Chicago, Ill; Disney Parks and Resorts (Dr Hymel), Yorba Linda, Calif; and American College of Occupational and Environmental Medicine (Ms Dreger), Elk Grove Village, Ill.

Authors Thibodaux, Bourgeois, Loepcke, Konicki, Hymel, and Dreger have no relationships/conditions/circumstances that present potential conflict of interest.

The JOEM editorial board and planners have no financial interest related to this research.

Address correspondence to: Donald P. Thibodaux, MD, 306 Amarillo Dr, Houma, LA 70360 (dthibodaux@acadian.com)

Copyright © 2014 by American College of Occupational and Environmental Medicine

DOI: 10.1097/JOM.0000000000000221

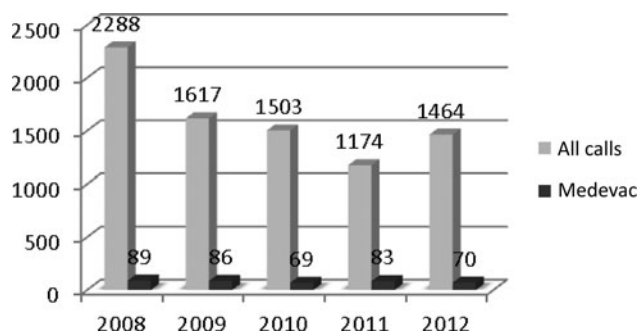


FIGURE 1. Number of medevacs each year out of all calls.

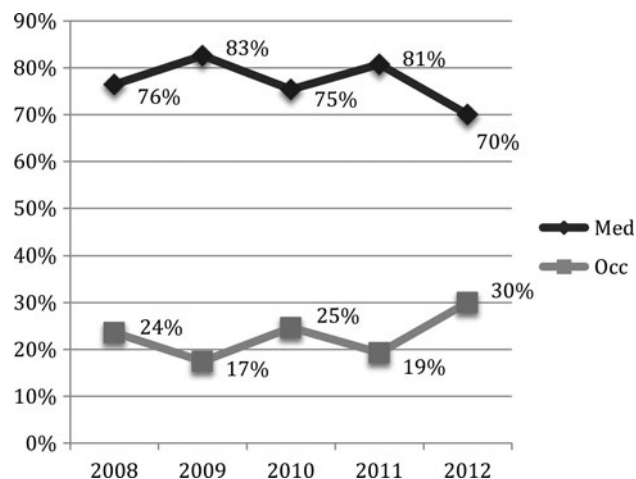


FIGURE 2. Percentage of medical evacuations by type (medical vs occupational) and year.

evacuation were cardiovascular conditions, abdominal pain, and neurologic/seizures. The leading occupational injuries resulting in medical evacuation were trauma and amputations.

When looking at the age range of those medevaced, younger workers had more transports due to occupational injuries than older workers. Medical conditions were the primary reason for air transport of the older workers as noted in Fig. 3. Approximately 35% of individuals evacuated were smokers and 29% were hypertensive.

As previously noted, a survey of companies was conducted in late 2012 to determine whether and what type of preemployment screening was conducted and whether this was for certain classes or covered all employees. Questions were also asked about the types of health and wellness programs offered. Of the 50 surveys distributed, 20 were returned for a response rate of 40%. Of the 20 companies responding, 17 (85%) require preplacement physicals for regular employees and 11 (59%) also require contract employees to have preplacement evaluations. In addition, 17 of the companies require regular employees who experience a medical problem while onshore to notify the company of this condition before returning to off-shore duty—15 of these companies mandate a return-to-work (RTW) evaluation. Nevertheless, if an individual is evacuated from the rig or platform, 19 of the companies (95%) require an RTW evaluation.

Eighteen of the companies (90%) indicated that they had a wellness program with the length of the programs ranging from 1 to 17 years. Nevertheless, only five of the companies allowed contract employees to participate in these wellness initiatives. Employee participation in wellness activities ranged from 10% to 70%. Figure 4

identifies the type of wellness programs being offered by the companies.

Costs for Medical Evacuation

The costs to medevac personnel from rigs and platforms in the GOM average \$44,333 to \$54,167, based on a 2- to 3-hour flight time per evacuation at an average cost of \$19,700 per hour (Table 2). Translated to business terms, if a company has a 10% profit margin, then the company would need to generate \$500,000 of new revenue to offset the cost of one \$54,000 medical evacuation. Commercial helicopter programs conduct the majority of medical evacuations in the GOM, with the US Coast Guard called in to assist in 1.5% of all evacuations. Besides being costly, medical evacuations can be dangerous particularly in inclement weather. Access to life-saving treatments may be delayed because of the time involved in having support arrive. Some companies station emergency medical crews on their rigs to decrease the time from illness or injury to initiation of treatment.⁴ There can be additional evacuation delays of hours to days due to weather and sea conditions, mechanical problems, or other unplanned issues.

A review of the literature found few studies that specifically identify the types of injuries and illnesses necessitating medical evacuation from oil rigs; the majority of these studies focused on North Sea evacuations. A 1996 study of Shell Expro rigs in the North Sea found that dental problems were the primary reason for most medical evacuations and were accountable for a high number of lost man-hours for oil operations in the United Kingdom.⁵

A 1998 study provided a retrospective review of data on medical evacuations from 1976 to 1984 from drilling rigs and platforms in the North Sea. During that time period, 2162 evacuations were conducted.⁶ Prior to 1980, the majority of the evacuations were for injuries on the rigs. From 1980 onward, illnesses accounted for approximately 50% of the evacuations with digestive system illnesses accounting for most of these cases.⁶ Of the injuries identified from 1980 through 1984, fractures accounted for 33% of evacuations and injuries to the hands and eyes were responsible for an additional 25%. The study noted that as the age of the evacuee increased, the proportion of evacuations for injury decreased, and those for illness increased.⁶

A 1997 report from the University of Oxford found that from 1987 to 1992, 55% of medical evacuations were for illness, with digestive, musculoskeletal, and respiratory problems accounting for the top three reasons requiring medical evacuations from rigs and platforms in the North Sea. When the data were reviewed by year, injuries necessitating evacuation fell from a high of 53% in 1978 to only 36% in 1991 to 1992.⁷

Another study conducted in 2002 looked at accidents in Brazilian oil refineries and found that there was a predominance of accidents in nonskilled workers during maintenance activities.⁸ Additional studies have reviewed accidents on drilling rigs off the coast of Brazil and in the North Sea, but these focused on the type and cause of accidents and remediation policies.⁹⁻¹²

In its 2011 annual report, Statoil, an international energy company, indicated that 226 medical evacuations were conducted in 2011 with 70% attributable to medical conditions, the most common being cardiovascular disease.¹³ A December 2012 UK report on oil stations injuries in the North Sea indicated that 60.9% of these injuries were suffered by individuals 25 to 49 years of age with those between 30 and 34 years of age having the highest incidence rate at 15.8%.¹⁴

DISCUSSION

Our review of the medevac data collected from 2008 to 2012 disputes the common perception that most medical evacuations from offshore oil installations are for occupational injuries or illnesses—the reality is that approximately 80% of all medevacs are due to nonoccupational incidents. The most common reason for medevac

TABLE 1. Reasons for Medevacs

Reason for Evacuation	2008	2009	2010	2011	2012	Grand Total
Medical reasons						
Chest pain	30	25	15	21	13	104
Abdominal pain	10	2	11	4	6	33
Syncope	4	6	4	8	3	25
Dysrhythmia		1	8	8	2	19
Neurologic	1	4	2	3	6	16
Infection	2	3	1	2	5	13
Seizure	3	5	1	2	1	12
H1N1 (to rule out H1N1)		11				11
Respiratory	3	2	2	2	1	10
Cardiac arrest		2	4	1	2	9
Kidney stone	2		2	3	1	8
Gastrointestinal bleed, lower/upper	1	1	1	3	1	7
Allergic reaction	3			3	1	7
Altered mental status	1	1	2		2	6
Weakness		1		1	2	4
Hypertension		1		2		3
Headache	2					2
Hypoglycemic reaction	2					2
Endocrine	1			1		2
Ingestion error	1		1			2
Pharyngitis	1	1				2
Suicide		1	1			2
Hypotension	1					1
Anxiety		1				1
Nose Bleed					1	1
Genitourinary				1		1
Deep vein thrombosis		1				1
Total medical causes	68	69	55	65	47	
Occupational reasons						
Extremity injury	4	4	4	5	5	22
Multiple trauma		3	2	7	3	15
Back injury	3	4	2	1	3	13
Head injury	1	4		2	6	13
Finger amputation	5		3			8
Chest injury	2	1	2		1	6
Eye	1			2	2	5
Heat illness	1		1	1		3
Burn	2	1				3
Finger injury					2	2
Chemical exposure	1					1
Abdominal trauma					1	1
Neck injury	1					1
Total occupational reasons	21	17	14	18	23	
Grand total	89	86	69	83	70	397

is chest pain and 45% of all emergent medical evacuations are potentially due to cardiovascular diseases. One in five (21%) of the chest pain evacuations were for myocardial infarction, coronary stent placement, coronary bypass surgery, or unstable angina. Fifty-two percent (52%) of the patients with chest pain evacuated were smokers and 59% had hypertension. Seven chest pain evacuees had ST-elevation myocardial infarction. Follow-up diagnoses were not obtained in greater than 50% of those evacuated with chest pain.

On reviewing the deaths that took place offshore over the 5-year period, there were nine cardiac arrests, two suicides, and two traumatic deaths. The cardiac arrests included one case of suspected ruptured brain aneurysm; two found dead in bed; one man aged 46 years with history of coronary stent placed 14 days prior; three high probability coronary artery disease (men in their 50s); and two autopsy-proven myocardial infarctions. Appropriate pre-placement and periodic medical examinations, fitness for duty after injury or illness, and preventive or wellness programs could decrease

the frequency and severity of many of these nonoccupational health problems. Many of these issues could have been screened for and treated prior to deployment.

The average cost of an evacuation is \$49,250. Over the 5-year study period, the estimated cost for the medical evacuations for cardiovascular disease was \$8.8 million. This does not factor in the medical care on shore, lost productivity, or replacing the worker's

position. The risks to the flight crew, patient, rig personnel, and the facility are also not calculated.

Although work-related accidents and injuries exert an enormous toll on employers above the medical and productivity loss, research has shown that common chronic conditions are on the rise across all age groups, although older workers while having lower occurrence of job-related injuries have higher overall rates of chronic disease risks^{15,16} and these conditions create a significant economic burden driving up total health-related costs in the workplace.¹⁷⁻²¹ Seven chronic conditions (cancer, heart disease, hypertension, mental disorders, pulmonary conditions, and stroke) currently cost the US economy more than \$1 trillion per year.²² But reasonable improvements in prevention, detection, and treatment of these 7 conditions can lead to 40 million fewer cases of illness, reduce health-related productivity loss by \$905 billion, and cut annual treatment costs by \$217 billion.

CONCLUSION

Medical evacuations from offshore oil installations are very costly and have significant inherent personal health risks. Inadequate or nonexistent medical evaluations prior to deployment and after any significant interval medical change may contribute to the number of medical evacuations. We believe that employers should perform appropriate preplacement/predeployment fitness-for-duty assessments

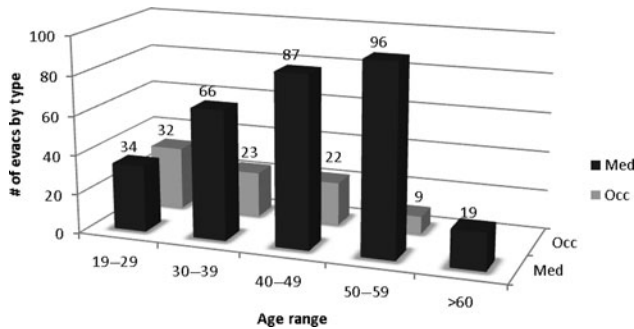


FIGURE 3. Medevacs by age and type (medical vs occupational).

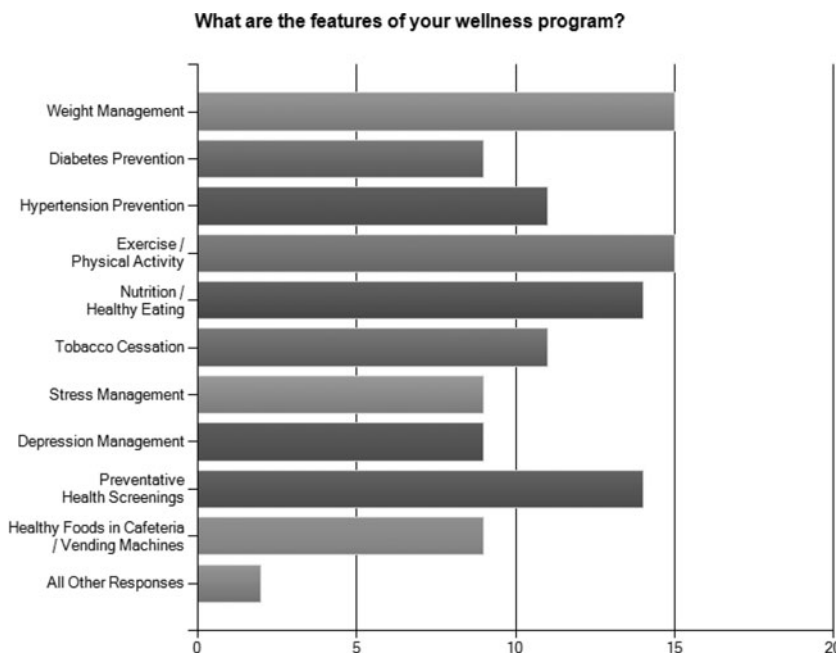


FIGURE 4. Features of wellness programs. Other responses included access to a spa and exercise facilities and quarterly activities to get points for discounted insurance rates.

TABLE 2. Cost Estimates for Medical Evacuation From the Gulf of Mexico*

	Cost Rate	Cost per Flight Time		
		2-h Flight	2½-h Flight	3-h Flight
Helicopter Company A	\$19,500/h	\$39,000	\$48,750	\$58,500
Helicopter Company B	\$34,000 fixed rate \$5,000/h	\$44,000	\$46,500	\$49,000
Helicopter Company C	\$40,000 fixed rate \$5,000/h	\$50,000	\$52,500	\$55,000
Average cost per flight		\$44,333	\$49,250	\$54,167

*Evacuation times are approximately 1 hour longer than the flight times due to flight preparation and down time on the rig. These costs are not included in the estimates.

on all offshore workers and conduct RTW evaluations prior to redeployment. Several companies performing these examinations have noted significant improvements in their emergency medical evacuation rates. We recommend preplacement/predeployment, periodic and postinjury/illness evaluations for those workers in remote areas. In addition, we recommend employers provide evidence-based workplace wellness, prevention, and disease management programs to reduce the risk of injuries,²³ and the burden of chronic illness that can help reduce the number of medical evacuations. Besides the obvious costs savings by preventing unnecessary evacuations, additional savings would include the hidden costs of lost productivity, replacing the evacuated employee and the medical costs on land.

Strengths and Limitations

In this study, we have shown that main reasons for medical evacuations from oil rigs/platforms were due to existing illnesses, not occupational related injuries or illnesses. Nevertheless, this study was limited by its small sample size and the need to explore the impact of gender, ethnicity, and type and length of employment on the need for medical evacuation.

REFERENCES

- Mair F, Fraser S, Ferguson J, Webster K. Telemedicine via satellite to support offshore oil platforms. *J Telemed Telecare*. 2008;14:129–131.
- Ponsonby W, Mika F, Irons G. Offshore industry: medical emergency response in the offshore oil and gas industry. *Occup Med (Lond)*. 2009;59:298–303. Available at <http://ocmed.oxfordjournals.org/content/59/5/298.full.pdf+html>. Accessed February 13, 2014.
- Anscombe DL. Healthcare delivery for oil rig workers: telemedicine plays a vital role. *Telemed J E Health*. 2010;16:659–663.
- Mallard AS. EMS offshore. A new horizon for paramedics. *JEMS*. 1991;16:50–52, 54.
- Duffy B. Dental problems in the offshore oil and gas industry: a review. *Occup Med (Lond)*. 1996;46:79–83.
- Norman JN, Ballantine BN, Brebner JA, et al. Medical evacuations from offshore structures. *Br J Ind Med*. 1998;45:619–623.
- Psychological Aspects of Work and Health in the North Sea Oil and Gas Industry*. Offshore Technology Report, Health and Safety Executive. Department of Experimental Psychology, University of Oxford; 1997.
- Souza CA, Freitas CM. Occupational accidents in an oil refinery in Brazil. *Rev Saude Publica*. 2002;36:576–583.
- Freitas CM, Souza CA, Machado JM, Porto MF. Work-related accidents on oil drilling platforms in the Campos Basin, Rio de Janeiro, Brazil. *Cad Saude Publica*. 2001;17:117–130.
- de Souza CA, de Freitas CM. Analysis of work-related accidents and incidents in an oil refinery in Rio de Janeiro. *Cad Saude Publica*. 2003;19:1293–1303.
- Bjorkum AA, Pallesen S, Holsten F, Bjorvatn B. Shift work and accidents—relevance for the offshore industry. *Tidsskr Nor Laegeforen*. 2004;124:2773–2775.
- Cooper CL, Sutherland VJ. Job stress, mental health, and accidents among offshore workers in the oil and gas extraction industries. *J Occup Med*. 1987;29:119–125.
- Statoil Company. Annual Report 2011. Available at www.statoil.com/AnnualReport2011/en/Sustainability/HealthAndSafety/HealthAndWorkingEnvironment/Pages/Telemedicine.aspx. Accessed May 29, 2014.
- Offshore Injury, Ill Health and Incident Statistics 2011/2012*. Health and Safety Executive, HID Statistics Report HSR 2012–1. December 2012.
- Grosch JW, Pransky GS. *Safety and Health Issues for an Aging Workforce in Aging and Work: Issues and Implications in a Changing Landscape*. Baltimore, MD: The Johns Hopkins University Press; 2010.
- Loeppke RR, Schill AL, Chosewood LC, et al. Advancing workplace health protection and promotion for an aging workforce. *J Occup Environ Med*. 2013;55:500–506.
- Thorpe KE. Factors accounting for the rise in health care spending in the United States: the role of rising disease prevalence and treatment intensity. *Public Health*. 2006;20:1002–1007.
- Chronic Conditions: Making the Case for Ongoing Care. *Update to Chronic Care in America: A 21st Century Challenge, a Study of the Robert Wood Johnson Foundation and Partnership for Solutions*. Baltimore, MD: The Johns Hopkins University Press; 2004.
- Collins JJ, Baase C, Sharda C, et al. The assessment of chronic health conditions on work performance absence, and total economic impact for employers. *J Occup Environ Med*. 2005;47:547–557.
- Thorpe KE. The rise in health care spending and what to do about it. *Health Aff*. 2005;24:1436–1545.
- Loeppke R, Taitel M, Richling D, et al. Health and productivity as a business strategy. *J Occup Environ Med*. 2007;49:712–721.
- Devol R. *An Unhealthy America: The Economic Burden of Chronic Disease. Charting a New Course to Save Lives and Increase Productivity and Economic Growth*. Santa Monica, CA: Milken Institute; 2007.
- Maniscalco P, Lane R, Welke M, Mitchell JH, Husting L. Decreased rate of back injuries through a wellness program for offshore petroleum employees. *J Occup Environ Med*. 1999;41:813–820.