British Journal of Industrial Medicine 1988;**45**:619–623

Medical evacuations from offshore structures

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ABSTRACT A retrospective study was carried out on medical evacuations from the installations of four major oil or gas producing companies, or both, operating offshore on the United Kingdom continental shelf. The study covered 1976–84 during which 2162 evacuations were recorded. Of these, 137 (7·7%) required the use of a chartered helicopter. In the earlier years of the study there were substantially more injuries sustained than episodes of illness recorded but from 1980 onwards the cases of illness equalled those of injury. Using the International Classification of Diseases, the digestive system was responsible for most evacuations for illness and of those, about half (115 evacuations) were for dental problems. Suspected fractures were responsible for about one third of those evacuated for an injury but injuries of hands and eye conditions were particularly common, accounting for 25% of all evacuations. As the age of the evacuee increased the proportion of evacuations for injury decreased and that for illness increased. The mean age for evacuation for injury was 28·3 years and for illness 34·4 years. Few evacuations were required for those aged over 45.

The oil and gas industry operating offshore on the United Kingdom continental shelf has become an established major industry in Britain with its own individual occupational health problems.[1,2] Solutions have been found for most of the current health related problems and a system of health care has emerged that is well suited to the particular needs of the offshore industry.[3,4] To improve the system and to be able to provide ready answers to the industry's occupational health problems of the future we need to establish a database of offshore incidents and to develop a system for maintaining it.

We report a retrospective study of medical incidents that required evacuation ashore from the offshore installations of four major operating companies working on the United Kingdom continental shelf. All incidents between 1976 and 1984 have been included. In addition to establishing the nature of the conditions during that time we tried to determine the possible existence of a pattern of morbidity and any changes in that pattern during the period of the study. We also tried to determine whether the judgments set out in the criteria for fitness to work offshore were correct.

An initial decision was required to determine the severity of the medical condition which would make it worth while or useful to investigate. It was agreed that a significant level of illness or injury was provided by those cases where evacuation was required. Since space is often at a premium offshore, personnel whose injury or illness prevents them from working are often evacuated, even though their management is well within the capability of the rig medic. On that basis, the use of the criterion of evacuation as a determinant of serious illness or injury seemed to be justified. A careful distinction was also maintained throughout the study between episodes of illness as distinct from injury. This seemed a useful distinction in determining possible changing patterns of illness and injury—their presentation and management. Also, an increasing rate of accidents often implies a primary failure in safety procedures and a need for an increased level of training. An increasing incidence of illness, on the other hand, implies a change in the medical characteristics of the workforce and efforts to reduce it are in the realm of the medical department rather than the safety and training departments, since reduction is largely a matter of determining medical standards for work offshore and ensuring that the criteria specified are met.

Accepted 7 September 1987

Methods

In the first instance a questionnaire was constructed which was designed to extract consistent data from reports compiled in a variety of styles since they came from four different companies. Because the study was retrospective a variable amount of information ideally required was not available from the existing records.

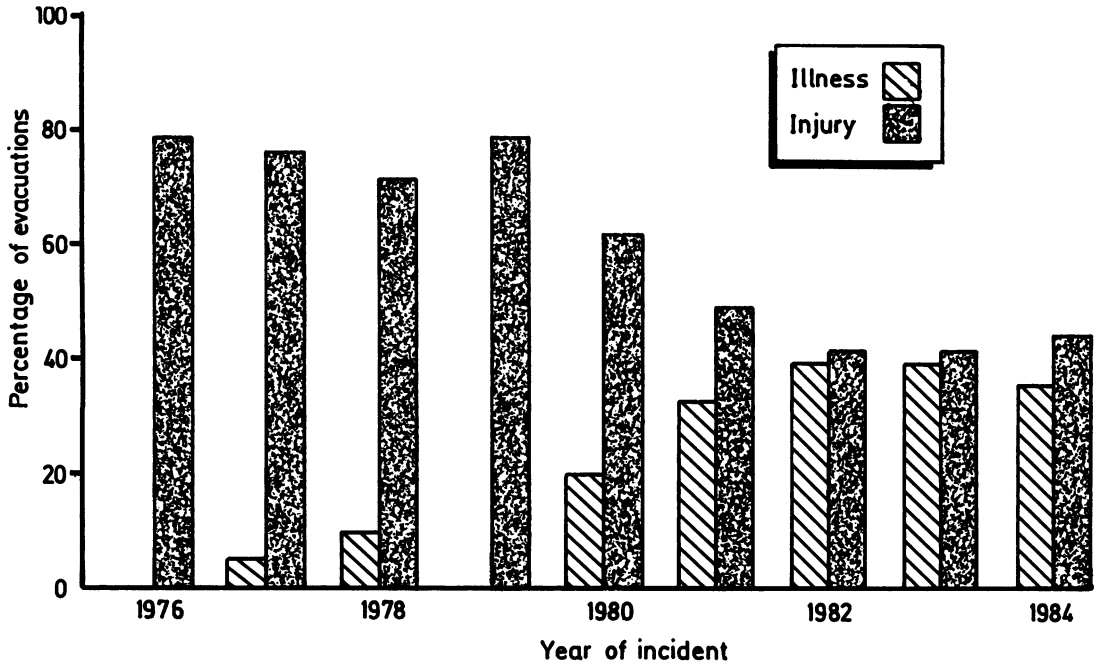

Fig 1 *Incidence of illness and injury offshore requiring medical evacuation for each year of the study.*

The investigating team extracted information from the various reports and records available and completed the questionnaires so far as possible. All information was then entered on to a Honeywell 66 mainframe computer and registered in accordance with the Data Protection Act, 1985. Where permitted information was entered in uncoded form; text and other information was coded before entering. Standard coding procedures were used where possible. Working diagnoses of illness and injury were coded using the International Classification of Diseases. For some information, due to the coding procedures used, the conditions were not mutually exclusive. For example, a fractured tibia could possibly coexist with an open wound of face or arm. After entry of the data on to the computer, they were analysed using the statistics package for social sciences (SPSSX, Update).

Results

There were 2162 evacuations from the offshore installations of the four companies during the eight years of the study: 137 (7·7%) of the personnel evacuated, however, required the provision of a chartered helicopter for evacuation.

When it was possible to identify whether the evacuee was a contractor's employee or an operator's employee (1900 cases) it appeared that the ratio of contractor employees evacuated was 90·6% to 9·4% of operator's employees.

Figure 1 sets out the incidence of illness and injury requiring evacuation during the eight years of the study. Most emphasis was placed on injury and the records were less comprehensive before 1980. During 1980 and 1981 there was considerable imbalance beween the incidence of illness and injury but it seems that the number of injuries evacuated was falling and the number of cases requiring evacuation for illness was rising (illness:injury was 25%:75% in 1980 and 40%:60% in 1981). During the subsequent years of the study, however, injury and illness have each accounted for about 50% of the medical evacuations.

Table 1 shows a breakdown of the cases evacuated for illness classified into appropriate body systems

Table 1 *Breakdown of cases evacuated because of illness*

Illnesses (system)	*No*
Disorders of digestive system	239
Disorders of musculoskeletal system	156
Disorders of respiratory system	117
Disorders of nervous system (including eyes and ears)	96
Mental disorders	42
Disorders of cardiovascular system	41
Disorders of skin and subcutaneous tissue	33
Genitourinary disorders	26
Infections and parasite infestations	35
Miscellaneous specified disorders	5

Table 2 *Breakdown of cases evacuated because of injury*

Injuries	*No*
Fractures of head and face	23
Fractures of spine and trunk	45
Fractures of arms	234
Fractures of legs	140
Dislocations	13
Sprains and strains	192
Intracranial injury without skull fracture	35
Crush injuries	62
Open wounds of head and trunk	65
Open wounds of limbs	120
Superficial injuries (abrasions, etc)	29
Contusions	132
Foreign bodies	156
Burns	71
Welders flash	9
Nerve and cord injuries	6
Traumatic complications and vague unspecified injuries	81
Poisoning: medicinal and biological substances	48
Toxic effects: non-medicinal substances	7
Effects of external environment—eg, air pressure	5
Complications of medical and surgical care	3

according to the International Classification of Diseases (1977). The digestive system accounted for the highest incidence of evacuations and about half (112 cases) were for a dental problem. The next most common problem of the digestive system was labelled haemorrhoids and anal fissure (36 cases). Of the remainder, 22 patients were evacuated on the presumptive diagnosis of peptic ulcer, 10 for strangulated hernia, 13 for appendicitis, 10 for gastrointestinal bleeding, and one for cholecystitis. Since a chartered helicopter was used to evacuate only one case of strangulated hernia, it is presumed that these hernias must often have been incarcerated rather than strangulated.

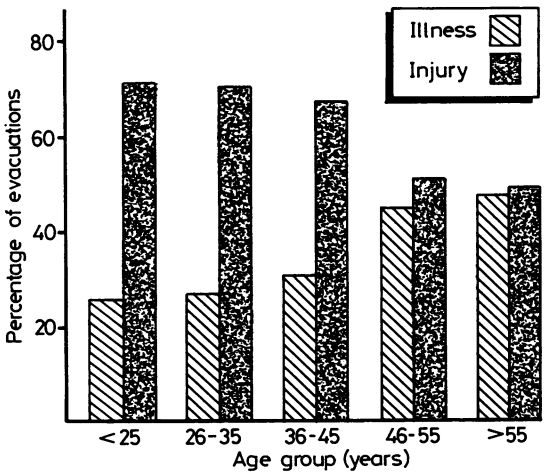

Fig 2 *Incidence of illness and injury offshore requiring medical evacuation for each decade of age.*

It is not surprising that the musculoskeletal system accounted for many of the evacuations and of the 156 cases evacuated, no fewer than 81 were suffering from acute back complaints. The respiratory system was responsible for a high level of evacuation and just under half of these cases were suffering from influenza. Disorders of eyes and ears were included with the nervous system cases. There were 23 ear problems and 43 eye problems and the only real problems of the central nervous system were five cases of migraine.

Disorders of the cardiovascular system did not figure prominently and of the 41 cases evacuated, 10 were suffering from some form of myocardial ischaemia or infarction. Mental disorders requiring evacuation were equally low in incidence and the bulk were accounted for by neuroses (22 cases). There were, however, five cases of alcoholic psychosis and four of organic psychosis.

Table 2 shows a breakdown of the cases evacuated because of injury. Suspected fractures were responsible for the largest number of evacuations for injury, accounting for 442. Since diagnosis without *x* ray facilities is a problem in these cases, it would be reasonable to add dislocations, strains, and sprains to this type of injury and this would bring the total to 647 cases or 44% of the cases evacuated for injury.

The group of 45 fractures of spine and trunk contained 31 rib fractures and five of the pelvis. Of the 192 cases of strains and sprains, 40 were of the back, 83 of the ankle, and 12 of the wrist.

When all types of injuries of the hand are taken together they account for 24% of evacuations for injury and 15% of all evacuations studied. Also, when all conditions of the eye requiring evacuation are studied they account for 10% of all evacuations. Thus injuries of the hand and eye conditions together account for 25% of all evacuations.

Of the related factors associated with these evacuations, the provision of an escort for the evacuee was considered necessary in only 121 (9%) cases. The

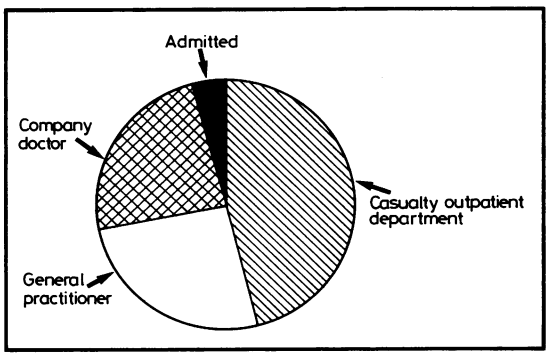

Fig 3 *Immediate disposal of evacuees on arrival onshore.*

status of the escort was specified in 77 cases: no qualification one, first aider six, qualified escort seven, rig medic 51, and doctor 12.

The general frequency with which consultation with an onshore medical adviser took place before evacuation is said to have increased over the period. Overall, however, consultation with an onshore doctor was only recorded as having taken place in 870 (40%) cases.

In fig 2 the frequency distribution of injury and illness is shown by age of the evacuee. The mean age of the 1314 cases evacuated because of injury was 28·3 years and the mean age of the 848 cases evacuated because of illness was 34·4 years. The pattern changed abruptly after age 45. Before then illness accounted for about 25% of the evacuations and the level did not vary much in each preceding decade. After 45, however, illness accounted for about half the evacuations and remained at that level in the next decade. Age was specified in the records of only 40% of the cases studied but in those cases where age was noted the distribution may be seen in fig 3. It may be seen that the peak age for evacuation was in the decade 25–35 years and the absolute number of evacuations in the older age groups was low.

Figure 3 shows the immediate disposal of the evacuees on arrival onshore in the form of a pie chart. About half the evacuees were treated initially by the casualty or outpatient services of hospitals but only 4% of the total required immediate admission to hospital.

Discussion

Since the study was retrospective and based on data derived from four different sources it is gratifying that so much information was available. Nevertheless, the questions could not be answered in about 27% of cases, and there was information that was not available and which would have been most useful in assessing the management of the conditions that arose. Such information includes the definitive onshore diagnosis to compare with the rig medic's working diagnosis. Deficiencies are common in all retrospective studies and whereas they limit the possibility of establishing facts authoritatively there is sufficient information here to establish trends, to generate hypotheses, and to allow a judgment to be made about the usefulness of further work of a prospective nature.

The distribution of illness and injury fulfilled expectation in some cases and was surprising in others. The preponderance of eye conditions and hand injuries which together accounted for 25% of all evacuations was striking. This figure must be of value to those associated with continuing rig medic education. The high level of digestive tract disorders is in itself less noteworthy than that the cause of half the problems was dental. This area has long needed attention by those responsible for the health care of those who work in remote places. Perhaps more could be done at pre-employment and routine medical examinations and it may be that doctors are not currently equipped to determine dental fitness adequately.

The high number of contractor's personnel requiring medical evacuation compared with operator's employees is well known to all concerned in offshore medicine. This must be partly due to the higher proportion of contractor's men normally found on an offshore installation and also to the different types of work which operator's and contractor's men usually carry out. Such a view could possibly answer the question if consideration were limited to accidents alone. Since 1981, however, half those requiring evacuation suffered from an illness rather than the effects of an accident. It is not possible to provide a firm answer from the data available but it seems possible that the standards of medical fitness of contractor's employees may differ from those of the operator's.

The influence of advancing years on the incidence of medical conditions requiring evacuation has caused some discussion recently. The high incidence of accidents in the younger age groups may reflect the increased care and experience of the older worker or merely the larger population of younger men offshore. In any event, the absolute number of personnel aged over 45 requiring evacuation for medical problems has been small in the past. It may be that advancing years in offshore workers will cause fewer problems in terms of increased requirements for medical evacuation than had been expected, but clearly the early establishment of a continuing system of surveillance would produce useful information on which to base personnel and medical policies in the future.

It could be said that the initial medical disposal of the evacuees indicates the seriousness of the conditions considered, and the fact that only 4% of those evacuated required immediate admission to hospital, suggests that an examination of conditions requiring evacuation is synonymous with appreciable offshore morbidity. On the other hand, the initial disposal arrangements could be reflected by the quality of the communications and in particular whether there had been consultation between the rig medic and the doctor before evacuation took place. Many companies now insist that medical consultation takes place before evacuation but this was not the overall picture obtained from the study. Thus a prospective study may show a different pattern of initial disposal, reflecting the introduction of improved procedures in recent years.

The management of all evacuations except 137 (7%)

without the need to use a chartered helicopter suggests that an efficient system of preventive medicine is being provided by the companies concerned. This may also be due to the relatively small numbers of such conditions as serious burns and intracranial haemorrhage. It could also reflect good preparation for travel by the rig medic during which delay for stabilisation procedures allows the evacuation to be undertaken by a routine flight.

These data set the scene and describe in quantitative terms the medical problems that arise on offshore structures and begin to establish trends of morbidity and other associated factors with time. The picture is, however, far from complete. An accurate and precise picture would require the participation of a substantial portion of the industry in a prospective study for several years, together with the provision of information that was not readily available to the current study team. Such a system of surveillance would be of value to individual occupational health departments of industry and to those responsible for the coordination of health, safety, and educational programmes. Its main value, however, would be in providing early signs of developing trends and in helping to supply answers to new problems as they arise.

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