Dental problems in the offshore oil and gas industry: a review

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The study of medical evacuation records from offshore installation workers indicates that dental pathology is a significant problem. Dental evacuations (dentivacs) account for the highest single category of medical evacuation (medivacs). Dentivacs result in human suffering and are the cause of many lost man hours for the major oil operators in the United Kingdom. This paper reviews the reporting of dentivacs at Shell Expro over a seven year period and makes some suggestions for the way forward in the handling of offshore dental problems.

INTRODUCTION

The story of Britain's North Sea Oil and Gas began in the mid 1960s. Only ten years later, the UK had converted almost entirely from town gas to natural gas and by 1981 the country was producing more oil than it was consuming. By 1985 the UK was amongst the largest producers of oil and gas in the world and had become a significant exporter. It is likely to remain a major oil and gas producer well into the next century, providing direct employment to over 20,000 people offshore and 100,000 people onshore.

It was against this background of increasing activity that Shell Expro established a company-based dental service in Aberdeen in 1981 whose activities were mainly directed at the onshore workforce. Today, this service appears to be unique in that Shell Expro Industrial Dental Service not only services onshore based workers but also offers support to the offshore based population.

The large investment in capital and ongoing costs requires that offshore operations are run continuously and efficiently. When crew members are unable to work due to medical or dental problems, extra costs are incurred. These costs increase when evacuation to the shore is required, and are compounded by the effects of bad weather.

The Shell review of offshore dental problems began in 1988 with the object of identifying the possibilities of improving dental health and thus reducing costs.

Review of the Literature

With the growth of activity in the oil and gas industry in the North Sea, offshore medical care has developed as a speciality. The subject has been reviewed comprehensively by Cox, Nelson-Norman and Brebner.

A review of the literature relating to the dental status of workers on offshore installations in the UK Oil and Gas industry revealed very little information. Hahn studied all those offshore workers who would agree to be examined immediately prior to embarkation and who worked on a variety of installations. He found that one in ten of the sample had a carious tooth and 70% showed evidence of periodontal disease. This evidence was based on the responses to a questionnaire. Costs for 45 evacuations during 1986 were estimated at £92,000.

Norman et al. carried out a survey of the reasons for medical evacuations from offshore structures from 1976–1984. During this period 2,162 evacuations were recorded, of which 115 (or 5%) were for dental reasons. A similar four company study (personal communication: Four Company Study) reported 112 (or 5.2%) dental evacuations between 1976–1984.

More recently, a survey of the dental health of the workers on two groups of offshore installations was performed and analyzed by Ballantine, Costigan and Anderson. The examinees numbered 493 out of a particular offshore population of 967. Eight per cent of those examined had been dentivaced. Thirty-six per cent were in the authors' 'high' or 'medium' risk group. Estimated costs for dentivacs in this study (1988) were in the region of £40,000 for 40 evacuations.
Table 1. Dentivac studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Dental evacuations</th>
<th>Dentivacs as a % of Medivacs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norman et al. (1976–84)</td>
<td>115</td>
<td>5.3</td>
</tr>
<tr>
<td>Ballantine</td>
<td>34</td>
<td>5.3</td>
</tr>
<tr>
<td>Costigan</td>
<td>27</td>
<td>5.5</td>
</tr>
<tr>
<td>Four Company Study (1976–84)</td>
<td>112</td>
<td>5.2</td>
</tr>
<tr>
<td>Robert Gordon Institute of Technology Study (1988–89)</td>
<td>53</td>
<td>7.0</td>
</tr>
</tbody>
</table>

INVESTIGATION

A review of the research methods used in previous studies revealed that some of the studies were retrospective.

An examination of existing medivac data at Shell, when investigated for dental problems, suggested a wide discrepancy with reported findings (Table 1) and suggested an under-reporting of dental problems. There appeared to be two main areas of concern:

- dental problems were being included in the category ‘disorders of the digestive tract’ when reasons for medical evacuation were recorded
- the reporting procedures were not detailed or specific enough to identify the ‘real’ dental component.

My own study was specifically designed to be on-going, using improved reporting procedures, targeting dental pathology and incorporating statistics in the medivac database. This also required the installation nurses (paramedics/Rig Medics) to have some dental first-aid training including the identification and management of dental problems.

By using a paper referral system for dental problems Expro’s Occupational Health Department hoped to identify dental disease patterns. Part of the spur for this investigation was that a less sophisticated analysis of Shell Expro data showed approximately 1,000 dental consultations in one year over 14 Northern installations. This was an early indication of a sizeable problem (Table 2).

Most of the problems reported were pathological and thus preventable.

METHOD

All manned Shell installations have a Rig Medic on board who has communication links with the shore by various means. Many of the Rig Medics will have had some dental training.

Information on dentivacs is gathered in a variety of ways:

- via a referral letter from the Rig Medic to the attending medical/dental practitioner
  The referral letter takes a triplicate form. The Rig Medic will send the letter to the attending practitioner who then adds a definitive diagnosis and treatment plan. One copy is retained by the practitioner, one returned to the Rig Medic and one sent to the onshore Expro Occupational Health Department who will extract the appropriate information for entry into computerized files.
- via a telex or telephone communication from the Rig Medic to the shore base
- from a questionnaire designed by the Dental Adviser for the purposes of deriving the data required, and completed by the Rig Medic from his/her records of consultations/medications.

In this way it is possible to trace the patient, the Rig Medic and the installation, and provide reliable reproducible results.

One possible flaw in the method has been identified—it is sometimes possible for a worker to leave an installation, be treated and return the same day without the Medic’s knowledge, if the worker uses the instal-

Table 2. Shell Expro dental consultations Northern Operations 1989. Information extracted from 14 offshore installations over 4 months, the total combined capacity of these installations being 2,360 at any one point in time.

<table>
<thead>
<tr>
<th>Type of incident</th>
<th>No. of consultations</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>5 (13)</td>
<td>0.05 (0.1)</td>
</tr>
<tr>
<td>Non-Industrial</td>
<td>288 (951)</td>
<td>3.30 (3.7)</td>
</tr>
</tbody>
</table>

*Figures in brackets indicated estimated annual figures

Table 3. Shell data

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Shell</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>145</td>
<td>38</td>
<td>107</td>
</tr>
<tr>
<td>1989</td>
<td>363</td>
<td>71</td>
<td>292</td>
</tr>
<tr>
<td>1990</td>
<td>547</td>
<td>76</td>
<td>471</td>
</tr>
<tr>
<td>1991</td>
<td>475</td>
<td>76</td>
<td>399</td>
</tr>
<tr>
<td>1992</td>
<td>452</td>
<td>82</td>
<td>370</td>
</tr>
<tr>
<td>1993</td>
<td>419</td>
<td>60</td>
<td>359</td>
</tr>
<tr>
<td>1994</td>
<td>424</td>
<td>49</td>
<td>375</td>
</tr>
</tbody>
</table>

Dentivacs

<table>
<thead>
<tr>
<th>Year</th>
<th>% as a percentage of medivacs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>7.5%</td>
</tr>
<tr>
<td>1989</td>
<td>14.3%</td>
</tr>
<tr>
<td>1990</td>
<td>12.4%</td>
</tr>
<tr>
<td>1991</td>
<td>13.3%</td>
</tr>
<tr>
<td>1992</td>
<td>14.6%</td>
</tr>
<tr>
<td>1993</td>
<td>10.7%</td>
</tr>
<tr>
<td>1994</td>
<td>12.2%</td>
</tr>
</tbody>
</table>
the emphasis is on treatment of the problem — this means dentivac in many cases. However, the obvious solutions should be based not only on the treatment of the condition but also on dental health promotion. Dental problems, when they occur, are identified and reported by the Rig Medic. In the offshore situation the medical care of workers is the responsibility of a paramedic (Rig Medic), usually a nurse with extended training, who liaises with shore-based general medical practitioners. The Rig Medic’s role is the key to the successful handling of dental problems in the field.

The introduction of the Health and Safety First Aid Regulations (1989) required by law that Rig Medics undertake relevant professional introductory or refresher courses before working offshore. These courses now include a dental first-aid requirement enabling the Medic to recognize and handle common dental problems. This enhanced knowledge of common dental pathology has obviously helped in the reporting and referral of dentivacs. The Rig Medic training is also supported at Expro by a Dental First Aid Manual and the services of a full-time onshore dentist for help, advice, etc.

An improvement for the future would be the provision of a standard dental first-aid kit for offshore installations.

The management of dental problems offshore will have to take account of the changing role of Rig Medics and their training requirements. Our ultimate aim is to keep healthy workers on the installation.

The role of the United Kingdom Offshore Operators Association (UKOOA)

Whilst taking into account UK legislation, UKOOA has the responsibility to set standards of medical fitness for offshore working. These standards are set on the advice of the Medical Advisory Committee (MAC) and are published in the UKOOA Guide5 ‘Guidelines for Medical Aspects of Fitness for Offshore Work’ (A Guide for Examining Physicians)—Appendices 1 and 2.
The current guidelines recommend a certificate of dental fitness before working offshore and appear to be applied inconsistently across the industry. Expro's view is that dental screening for pathology is necessary and that the examining physician should screen all offshore workers at the medical for dental fitness. Any doubts are then referred to the Dental Adviser and medical certificates issued as a pass/fail/limited validity dependent on the dental opinion. This is currently being supported by in-house training for our offshore doctors in the recognition of common dental pathology and management of dental problems. A certificate of dental fitness, issued by the employee's own general dental practitioner, is perfectly acceptable.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The results of this study show that offshore workers have a considerable amount of untreated dental disease. Large numbers of the offshore workforce report to the Rig Medic suffering from varying degrees of pain of dental origin. This study should be taken further to examine the full scope and management of dental problems offshore in order to identify real, rather than estimated, costs.

The obvious solution to the scale of the dentivac problem lies with dental screening but it appears that the UKOOA guidelines for dental fitness are being applied inconsistently across the industry. What would be required would be the uniform application of dental screening whilst simultaneously promoting dental health throughout the offshore population.

Better communication between Occupational Health Departments, workers and management is necessary and should lead to workers taking responsibility for their own dental health, and management recognizing the problem and cost implications. This recognition could, in turn, lead to resources being provided for training and health promotion in order to improve efficiency and save suffering, time and money. In addition there must be a procedure established to ensure that dentivaced workers can return to an installation only after proof of dental fitness.

Regular review and recommendations should be provided by dental input into the UKOOA Medical Advisory Committee.

The potential of developing technology should be addressed. An example would be in the use of radiography as an aid to the diagnosis of dental problems in remote locations.

In 1992, among Shell offshore workers, time lost through sickness absence was 4.5 times that lost as a result of injury. Dentivacs account for a sizeable proportion of that sickness absence time loss. Dentivac costs have been estimated but should be accurately quantified.

It is clear that there is considerable scope for further research in this field, particularly in the knowledge that the majority of dental problems are preventable.

ACKNOWLEDGEMENTS

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REFERENCES

2. Cities on the sea, Shell Publication.
8. UKOOA Guidelines, Guidelines for medical aspects of fitness for offshore work (A guide for examining physicians).
APPENDIX 1: UKOOA GUIDELINES

The policy of the UK Offshore Operators' Association is that all persons designated as offshore employees shall be medically fit to work in that location. The employer will be responsible for all the administration associated with the medical assessment and certification. The purpose of the medical assessment is to determine the fitness of the individual to work at an isolated location. Frequency of examination:
- up to 39 years of age—3 yearly
- 40–50 years of age—2 yearly
- 51 years and over—annually

Procedures
Candidates examined for fitness to work offshore should be in the possession of a certificate of dental fitness obtained no more than within 3 months prior to the date of the proposed medical examination. Failure to submit this should limit the date of the validity of the certificate of fitness to work offshore until it is submitted to the examining physician. Assessment of fitness to include dental screening by physicians.

APPENDIX 2: SHELL EXPRO INTERPRETATION OF UKOOA GUIDELINES

General fitness, including dental fitness, to be assessed by examining physician. Medical/dental certificate issued as a pass/fail/limited validity. Referral to Dental Adviser if necessary. Shell doctors to undertake dental training/updates. No fees for dental examination/treatment will be reimbursable.

Maintenance of Dental Health
- Individual responsibility
- Cost borne by the patients
- Offshore dental health promotions advised

Training
- Rig Medic courses
- Dental updates for physicians

Dental Standards
- Pain-free
- Infection-free
- Optimum function and comfort