IPIECA

International Association of Oil & Gas Producers

Health management in the oil and gas industry

A guide for the oil and gas industry

Health

THE GLOBAL OIL AND GAS INDUSTRY ASSOCIATION FOR ENVIRONMENTAL AND SOCIAL ISSUES

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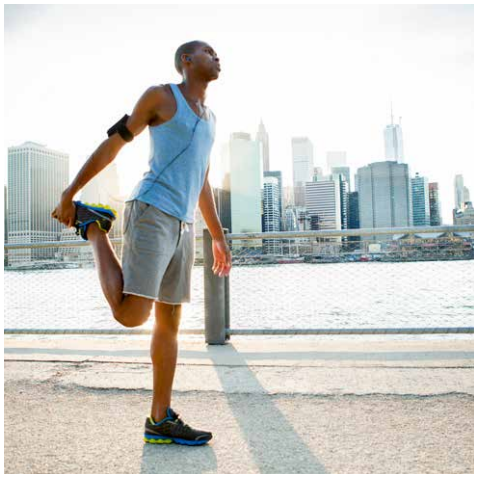

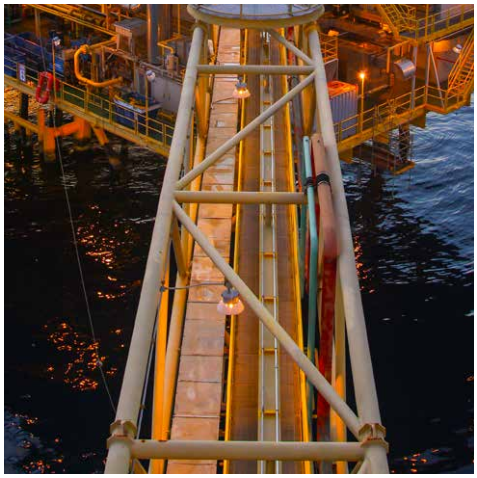

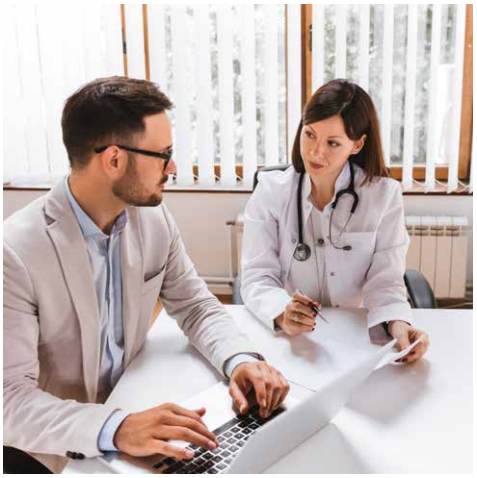

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Scope

This document integrates the recommendations that the IOGP-IPIECA Health Committee considers essential for optimal health and human performance. This is the third edition and supersedes the second edition, published by IOGP-IPIECA in 2011. This guide sets up an operational framework that builds on, and refers to, other IOGP-IPIECA guides where appropriate for more detail. The framework is presented primarily from the perspective of projects and field operations in upstream activities; however, the underlying principles of health risk assessment and mitigation are equally relevant to midstream and downstream activities as well as office locations.

Executive Summary

The purpose of health services in the oil and gas sector is to improve performance and wellbeing of workers and, in doing so, to manage risks to health and safety.

Safeguarding and improving the health and wellbeing of staff – employed or contracted – is in the best interest of companies in the oil and gas industry. This 'best interest' goes beyond compliance and corporate duty of care; it goes directly to the bottom line of a business. Effective leadership around health and human performance brings significant additional value, both to people and the business.

This focus on the purpose of health surfaces underpins the main changes between this guide and its previous versions. The content has been organised in such a way that it links the different components of health services and how they together deliver on the overall purpose. The content has also been updated to reference other guidance published by IOGP-IPIECA and can be used as the starting point for organising health services.

HEALTH IN THE ORGANISATIONAL CULTURE

Worksite cultures vary. Some worksites see health requirements as a regulatory requirement only, and a hindrance to efficiency and profitability. Other organisations are intrinsically motivated to manage health, viewing health management as a natural component of operating a business. Safety is now embedded in the culture of the oil and gas industry, and embedding health concerns in a similar way is the next step. It has been observed that sites with a well-developed health and safety culture show higher levels of worker engagement and enjoy more sustainable health, safety, and business performance outcomes compared to others. Instilling a culture of care takes time, and is possible only with leadership commitment from line to senior management, competent healthcare practitioners, and a mature health management system in place.

THE BOTTOM LINE - A BUSINESS CASE AND RETURN ON INVESTMENT FOR HEALTH SERVICES

Investing in the health and safety of staff is not only often legislatively mandated, but is also the right thing to do and can provide a solid return on investment for a business. Fit for purpose health management systems which utilise a risk-based management approach can avoid significant direct and indirect costs whilst also adding additional business value.

The examples below describe two main mechanisms in which health interventions contribute to a business's overall business performance. The *direct* impact on the bottom line comes primarily from a reduction of a company's costs stemming from production loss due to illness, medical bills and insurance premiums, in addition to the substantial expenses associated with substituting staff that must end an assignment early due to poor health. *Indirect* positive impact on the bottom line comes from focussing on staff performance, health and wellbeing which all drive worker engagement, which in turn is linked to overall business and safety performance.

An example of direct impact is the use of remote healthcare technology that reduces the cost to operations by negating the need to rely on expensive standby medevac helicopters. In one seismic campaign, the direct cost savings were over $3 million (US).

Additionally, indirect cost from work interruptions and scheduled delays can be reduced by introducing simple health and wellbeing interventions. These interventions have been shown to improve project delivery and HSE performance in projects and operational assets. In addition to avoiding cost, the right health interventions can contribute directly to the bottom line, by increasing the healthy high performance of staff by empowering people and the business to thrive and perform at their best. Additionally,

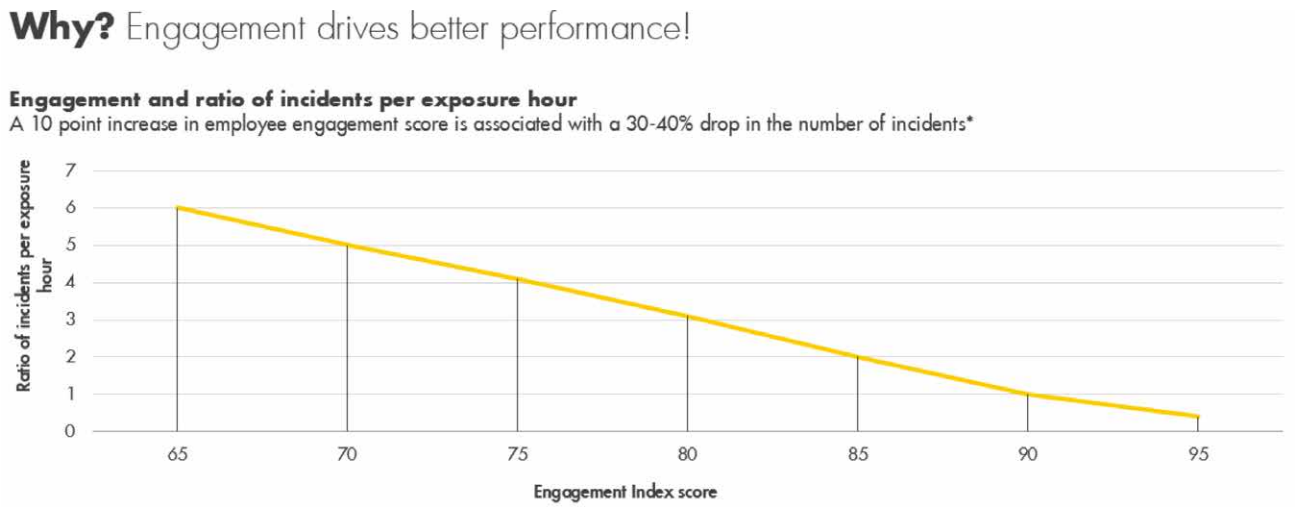


Figure 1: Based on a study at Royal Dutch Shell
Higher employee engagement correlates with lower ratio of incidents in the workplace.

these types of programs can positively impact recruitment and retention of staff, further reducing cost and improving performance.

A series of interventions implemented in projects at one company consistently improved business performance metrics: 30% above average hands on tools time (HoTT), four times improvement quality in welding, 60% fewer unsafe acts and conditions and a significant reduction in total recordable cases that, when combined with a reduction in total hours, was greater than 20%. Studies showing similar returns on investment from health interventions were published by the Harvard Business Review and the Journal of the American Medical Association.[1, 2] The RAND Corporation put the ROI of $3.80 for every dollar spent by businesses on disease management.[3, 4]

Together these examples show the clear business opportunity that good health management provides.

[1] Hemp, P. "Presenteeism: At Work—But Out of It". *Harvard Business Review.* October 2004.

[2] Stewart, WF et al. "Lost Productive Time and Cost Due to Common Pain Conditions in the US Workforce." *Journal of the American Medical Association* 290 (18). 2003. p.2443-54. 10.1001/jama.290.18.2443.

[3] Mattke S et al. "Workplace Wellness Programs Study: Final Report". *RAND Health Quarterly* 3 (2).

[4] Caloyeras et al. "Managing Manifest Diseases, But Not Health Risks, Saved PepsiCo Money Over Seven Years," *Health Affairs.* 33 (1). 2014. p. 124–131.

HOW TO USE THIS GUIDE

This report is aimed at three distinct groups of staff: (Senior) Business Managers, HSE and health managers or equivalent, and health professionals. Successfully delivering on the purpose of health services will require wider employee participation, but in this guide, it is assumed that this will occur as a result of the actions of the three categories of users.

1. **(Senior) Business Managers**: The people who influence budgets and decide on project and asset strategies, but who are not involved in the actual running of Health programmes, benefit from a broad understanding of the opportunities that an integrated health strategy brings to a business.
2. **HSE and health managers or equivalent**: Those people responsible for the design and overall management of health-related activities, as well as providing leadership on health for their business stakeholders.
3. **Health professionals**: The implementers of health programmes within the health strategies.

This report is organised into four sections: (1) Integrated Health Management Systems, (2) Health Risk Assessment and Opportunities, (3) Health Risk Mitigation and Management, and (4) Healthcare Delivery.

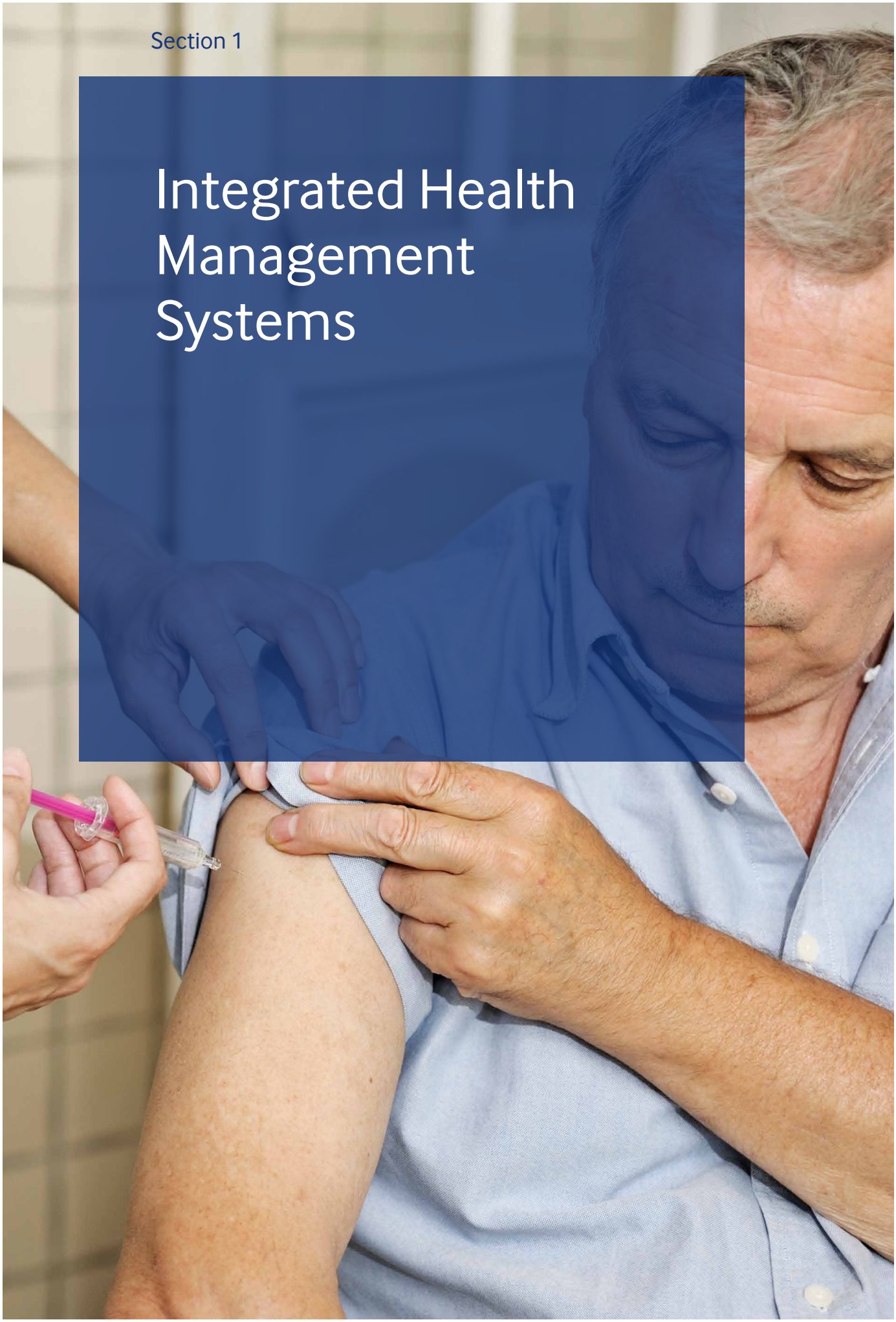
Together, these four sections provide the narrative of the Health System's purpose: implementing a robust Integrated Health Management System enables companies to optimise health and wellbeing at their sites. The Integrated Health Management System will identify health risks and opportunities and act on these by introducing preventive health strategies, delivered by competent health professionals, who should also be able to respond to medical emergencies should they occur.

Time saver: Read the executive summary and Appendix 1

While the entire contents of this guide are relevant for those who are involved in the active management of health-related activities, senior managers might only need a high-level understanding of the purpose, business case, and main components of what health services bring to a company. The first two elements are addressed in this executive summary. The main components of a health system are summarised in Appendix 1.

Section 1

Integrated Health Management Systems



Integrated Health Management Systems

An integrated health management system, properly executed, enables a company to optimise health and wellbeing at their sites and to organise the right mix of professionals, equipment, and other resources to achieve the desired health and business outcomes. Methods in this system include the assessment and management of health risk, using both preventive and curative strategies, as well as delivering on the opportunity to provide additional benefits to the organisation by supporting the wellbeing and healthy high performance of staff.

An integrated health management system can be part of a broader HSE management system, a 'stand-alone' system, or as part of the management system of other areas (human resources, sustainability, etc.).[5] For this reason, this guide will build upon IOGP-IPIECA 510 - *Operating Management System framework for controlling risk and delivering high performance in the oil and gas industry*, referred to in this report as the OMS Framework. In the OMS Framework, a health management system is designed "to help companies define and achieve [health] performance goals and stakeholder benefits, while managing the broad and significant range of risks inherent in the oil and gas industry."[6]

The activities that a health management system needs to address include the following:

- health risk assessment and planning
- health impact assessment
- industrial hygiene and control of workplace exposures
- fitness for task assessment
- health surveillance
- promotion of good worker health
- control of food, water and sanitation issues and other factors influencing worker welfare
- public health interface
- management of ill-health in the workplace
- medical emergency management
- drugs and alcohol policy and programme
- medical records management and health reporting
- Health Performance Indicators (IOGP-IPIECA 393 – *Health Performance Indicators – A guide for the oil and gas industry*)

1.1 OPERATING MANAGEMENT SYSTEM FRAMEWORK

A successful Operating Management System (OMS) framework includes four fundamental components: leadership, risk management, continuous improvement, and implementation.

Leadership

Support and commitment are essential to achieve the aspired health goals. Leadership decisions that fully incorporate health risks and opportunities will amplify the effectiveness of a health management system through:

- leading by example and showing their care for the health and wellbeing of staff and contractors in their daily actions and activities
- setting and clearly communicating policy and strategic objectives
- assigning responsibilities, providing resources, and setting standards
- planning and designing procedures
- meeting legal requirements
- assuring quality through audit and management review

Line managers are often the gatekeepers to facilitating involvement in health and wellbeing activities and can directly influence culture around health and wellbeing. Thus, targeting this group will be important for implementing health goals. Nevertheless, health leadership is not limited to (senior) managers; it can be demonstrated by everyone in an organisation by contributing to a culture where the awareness of health risks and benefits are integrated into all activities.

Risk management

In the specific context of health management in the oil and gas industry, risk can take many forms and may include:

- permanent disability and or mortality caused by work related incidents
- acute or chronic illness and/or injury due to exposure to physical agents, noise, toxins or accidents
- illness due to exposure to psychological/mental pressure related to workload and work environment

[5] Throughout this document, health management is viewed as part of a broader Health Safety and Environment (HSE) strategy as this is the most common organisational mode. However, the underlying concepts and practices can equally be applied if health management is the responsibility of another organisational unit.

[6] IOGP-IPIECA 510 – *Operating Management System framework for controlling risk and delivering high performance in the oil and gas industry.*

- accidents caused by fatigue stemming from excessive work hours, shift patterns and/or events outside work
- avoidable incidents due to disengagement from work that could also be caused by non-work related factors
- non-work related illnesses that manifest in the work environment
- injury due to exposure to extreme environments (i.e., adversely hot or cold climates)
- increased morbidity due to inability to effectively manage chronic medical conditions in remote locations

The above risks can be controlled and mitigated by technical, organisational, or operational barrier/control elements. At the same time, when dealing with the consequences of a health risk, the level of mitigation (care) needs to be as high as reasonably practicable.

The management system should therefore define and incorporate risk management and mitigation actions, competency requirements for personnel involved, and specific tools for consistent implementation.

Continuous improvement

In the health management system, continuous improvement is a vital part of management review and can:

- protect and improve worker health
- prevent recurrence of accidents by adjusting controls when appropriate
- optimise business performance and reputation
- identify prospective and emerging risks
- ensure cost-effectiveness

Successful completion of the above depends on the ability to learn from experience and then improve on performance accordingly. The OMS Framework describes in greater detail suggested steps for successful planning and execution, referred to as the "Plan, Do, Check, Act [PDCA]" cycle. The PDCA cycle is especially relevant to health topics as health risks are continuously changing and the way in which these risks are managed should evolve accordingly.

Implementation

The actions of the individuals working within a health management system are central to its success or failure. Therefore, clear ownership, accountability, and competence need to be assigned and assured frequently. The PDCA approach described under 'continuous improvement' is a useful tool, both at the macro (organisation wide) as well as the micro (day-to-day activities) level.

In assigning specific tasks to individuals it is important to keep business continuity in mind to make the overall health management system resilient to change.

1.2 HEALTH REPORTING AND MEDICAL RECORD MANAGEMENT

There is likely to be a legal requirement for reporting, either by host or home country legislation, which must be complied with. Internal reporting to both local and corporate management is normally a routine requirement. Industry representative bodies may also request information.

Legislative reporting

Legislative reporting is non-negotiable. The information requested, and the form of presentation, will be governed by the relevant health and safety laws applicable to the operation. There is wide variation between countries as to the nature and amount of legislative reporting related to occupational illness and infectious disease. This information may not be anonymous and could require the identification of individual employees, in which case circulation of reporting documents should be restricted, ideally to the health department only.

Internal reporting

All companies should require internal reporting of health information. Occupational and work-related illness should be treated with the same importance as an accident or incident, using much of the same process for investigating the cause, and for improvement of controls. Still, occupational illness is poorly reported industry wide, and specific efforts should be made to ensure that instances are identified. The long latent period for the development of occupational illness means that many cases are reported a considerable period after the onset of exposure, possibly after the individual has changed job or location. Because of these delays in onset, it is essential to also track and record potentially harmful exposure data and other industrial hygiene (IH) information.

Anonymous reporting of grouped health data will identify areas where targeted intervention may produce cost-effective health improvements. These can be related to key performance indicators which are important to quantify effectiveness of health programmes, justify health expenditure and plan health provision. Good IH data reporting will be helpful in tracking the effectiveness of health risk mitigation strategies. For further guidance on the identification of appropriate health performance indicators, see IOGP-IPIECA 393 - *Health Performance Indicators*.

Company corporate functions will normally require anonymous reporting of health data to map illness trends at a global level to allow strategic planning of health services. This information may be different from that required locally.

Industry reporting

Industry representative bodies may request health information that relates to initiatives that they are involved in. These may be ongoing projects (e.g., HSE statistics) which can be useful tools for industry benchmarking or may be a targeted piece of research. Participation in this type of reporting is essentially optional but may be a requirement of membership of the body.

Health and medical records management

Good health monitoring, exposure data, and medical records are essential not only for recording but for the protection of patients, health professionals, and the company. Companies should develop standards for health and exposure records management which comply with appropriate legislation, corporate standards, and international best practice.

Health records are defined as any information pertaining to the medical or occupational assessment, care, treatment, surveillance or other intervention related to the health of the individual.

Health records must be kept for each employee and should detail each assessment, medical contact, intervention or communication. They should be identifiable as belonging to a specific individual and must be accurate, contemporaneous and legible. They may be physical (hard copy) or electronic records.

Records must be kept secure and accessible only to health department staff who must have signed a confidentiality agreement as part their employment contract. To protect electronic health/medical records against data leaks and breaches, effective collaboration with IT specialists is essential and compliance with relevant Data Privacy regulations is mandatory. Identifiable health data may be shared with other health professionals if either implied or expressed consent is obtained from the involved individual.

Relevant data sufficient for reporting requirements should be maintained in the health records. To ensure uniformity, a health coding system such as the World Health Organisation's International Classification of Diseases[7] will enable standardisation across different areas of the business.

1.3 CONTRACTOR HEALTH MANAGEMENT SYSTEMS

Contractors are employed for a multitude of important tasks and activities. It is essential to ensure that health risks of contracted activities are identified early, and that the health controls are in place to reduce any potential for harm.

Contractor health management is described in IOGP 423 - *HSE Management – Guidelines for working together in a contract environment*. The key outcome of a successful contractor health management system should be to ensure that adequate and competent resources are allocated that meet both company and statutory requirements and demonstrates continuous improvement.

1.4 COMPETENCE

The scale and level of resource allocation and the competence required for the effective implementation of a health management system varies depending on the degree of risk that is being addressed as well as the size and complexity of the asset or project. As part of health management system design, the individual roles and the appropriate level of competence for each role need to be described carefully. Resources and a competence framework for (HSE) management roles can often be managed by company policies and practices. For those roles providing clinical services, such as first aiders, medics, nurses and doctors, as well as those providing industrial/occupational hygiene support, certified diplomas and registration with medical boards, or other professional accreditation bodies, can act as adequate surrogates of baseline competence.

A significant challenge lies in the assessment and maintenance of current medical competencies. The reality of clinical work in the oil and gas industry is that clinical practice can be limited. For example, a medic on an offshore rig can go months, or even years, without treating a severe injury. Nevertheless, the expectation is that this same medic will be able to act effectively when a severe injury does occur, or if multiple casualties are involved in a remote location.

[7] World Health Organization. International Classification of Diseases, 11th Revision (2018). https://icd.who.int/browse11/l-m/en

To mitigate skill decay, continuous professional development programmes (for example, rotations in emergency rooms) to maintain and grow clinical skills and competencies should form an integral part of a health management system. Ongoing training using online resources and the emerging field of serious gaming – where relevant skills are practiced using game-based platforms – should be integrated into the competence maintenance programmes for clinical and IH staff. Additional assurance that effective care will be available when needed, can be provided by remote healthcare technology. 'Over the shoulder' coaching (such as using telemedicine), combined with contemporaneous online training in protocols and medical procedures, has the potential to dramatically improve medical competence just at the time it is most needed. This approach also has the advantage of reducing the level of baseline competence required from first aiders and medics, as support from health professionals with advanced training is available in real time.

1.5 CSR AND SHARED VALUE

While this guide does not address directly how to implement health programs as part of corporate social responsibility (CSR) and Shared Value initiatives, it is important to note that combining investment in health for the workforce can often be done in parallel to improvement of community health. Entering into sustainable partnerships with governments and host communities to facilitate improvements in health already form part of many company's CSR programmes. Such effective partnerships with stakeholders, based on consultation and respect for host culture, can take many forms but does not necessarily involve building expensive facilities or infrastructure. Increasingly, corporate social responsibility health projects are related to preventive health care and should build on existing government or community health programmes involving local capacity building.

Good social responsibility programmes will necessitate professional risk assessment, extensive dialogue and management of stakeholder expectations and a good understanding of local context. Ultimately, corporate social responsibility may be seen as mitigation of social risk, as well as forming the basis of the industry's licence to operate. To most companies it is just the right way of doing business.

The UN's Sustainable Development Goals (SDGs) are the most widely used framework to inform social investment programs. Together with the IFC and UNDP, IPIECA has developed a document on the relationship between the oil and gas industry and the SDGs: *"Mapping the Oil and Gas industry to the Sustainable Development Goals: An Atlas"*. Additionally, the International Standard ISO 26000:2010, "Guidance on Social Responsibility", provides globally relevant guidance for organisations of all types based on international consensus among expert representatives of the main stakeholder groups. The ISO 26000:2010 Standard only contains voluntary guidance on social responsibility and is therefore not used as a certification standard.

Section 2

Health Risk Assessment and Opportunities

Health Risk Assessment and Opportunities

HEALTH RISK ASSESSMENT AND PLANNING

The purpose of a Health Risk Assessment (HRA) is to provide the necessary information and understanding of health risk to prevent acute and chronic health effects to the workers in that work location. These assessments will need to be conducted throughout the life cycle (all phases) of business operations, including reassessment every one or two years as required by changes in the work environment or business operations. Individual health hazards should be identified, their interactions and risks to health evaluated, and appropriate mitigation, control, and recovery measures determined.

To assess risk, use reliable data and competencies to derive:

- The likelihood of an adverse event occurring (e.g., frequency of a particular type of injury or illness occurring at the location, in the business, or in the industry)
- The severity of the outcome (e.g., whether the hazard will cause minor health effects, major health effects, or deaths)

Factors that affect the likelihood and severity of the outcome/injury/illness include:

- The nature of work activities performed at a site
- Number of people on site
- Project duration
- Transportation options and availability
- Transportation infrastructure
- Location/access to external medical resources
- Geography
- Climate
- Means of communication with internal and external healthcare providers
- Security
- Characteristics of the working population (e.g., age profile, gender mix, migrant status)

Following this approach will identify and rank the relevant health risks associated with an operation and require input from the business that owns the risks, health professionals and other professionals such as industrial hygienists depending on the legislation and/or the company organisation. The list of identified risks/outcomes will often include some or all of the following:

- Major injuries due to accidents, with or without delay to treatment (see section four of this guide)
- Food borne illness outbreaks (See also: IOGP-IPIECA 397 - *A Guide to Food & Water Safety*)
- Fatigue (See also IOGP-IPIECA 492 - *Assessing risks from operator fatigue*, IOGP-IPIECA 536 - *Fatigue in fly-in, fly-out operations: Guidance document for the oil and gas industry*, and IOGP-IPIECA 488 - *Performance indicators for fatigue risk management systems*)
- Extreme heat or cold (See also: IOGP-IPIECA 398 - *Health aspects of work in extreme climates*)
- Dental emergencies
- Infectious Diseases (See also: IOGP-IPIECA 559 - *Infectious disease outbreak management*, IOGP-IPIECA 382 - *Managing Malaria: A guideline for the oil and gas industry*, IOGP-IPIECA 481 - *Vector-borne disease management programmes*, and IOGP-IPIECA 394 - *Managing tuberculosis*)
- Cardiovascular incidents (See also: IOGP-IPIECA 491 - *Prevention of heart attacks and other cardiovascular diseases: A guide for managers, employees and company health professionals*)
- Psychological hazards and stress (See also: IOGP-IPIECA 495 - *Managing psychosocial risks on expatriation in the oil and gas industry*)
- International travel (See also: IOGP-IPIECA 387 - *Travel Guide: A guide to health & safety for the oil & gas professional*)

The exposure to these and other risks should inform health management programming from fitness for task requirements, to trainings for individual employees, permit to work systems and medical emergency response requirements.

For further detail on the HRA process, please refer to IOGP-IPIECA 384 - *A roadmap to health risk assessment in the oil and gas industry.*

2.1 ONGOING ASSESSMENT OF WORKPLACE HAZARDS

The exposure (over time) to various Health Hazards in the work environment is what causes illness or injury to workers. For example, illness from exposure to a toxin or injury due to a fatigue-induced accident. Continuous (re)assessment of actual exposure to health hazards at work sites is essential to managing the health risks of individual employees and contractors as well as the HRA review process. In many countries this ongoing assessment of health risk and exposures is mandated by law.

Identification and control of these health hazards is part of industrial hygiene programmes, which include the following components: (1) hazard identification, (2) risk evaluation relative to exposure to hazard, (3) hazard monitoring, (4) control plan development, (5) employee training and control plan implementation, and (6) evaluation of the effectiveness of controls.

Workplace environmental health hazards include:

- Chemical: dusts/fibres, fumes, mists/aerosols, gases, vapours, smoke
- Physical: noise, vibration, radiation (ionising and non-ionising), temperature (heat or cold stress), illumination, pressure, ventilation, Naturally Occurring Radioactive Material (NORM), asbestos
- Biological: bacteria, viruses, fungi, moulds, parasites, insects, and animals
- Ergonomic/human factors: repetitive motions and tasks, manual handling, fatigue, work station design/operations, shift work
- Psychosocial: workplace stress related to workload, organisational changes, conflict management, job satisfaction, employee-job fit, fatigue, training, ageing workforce, etc.

The methodologies in which the actual exposures to these hazards can be measured are rapidly developing and expanding. Continuous (remote) monitoring of chemical exposure is becoming easier with the introduction of more advanced measurement devices. Moreover, devices for continuous monitoring (worn by a person in the workplace) not only measure exposure but can also monitor for any acute health effect on a person by monitoring vital signs as well.

Other emerging technologies such as drones are revolutionising the oil and gas industry in many ways and Industrial Hygiene can benefit from this as well. This is similarly the case for the increasing need to use 'big data' methodologies to digest larger data sets that come with increased monitoring. These same data analytics tools can also be used to model the effect of health hazards more accurately.

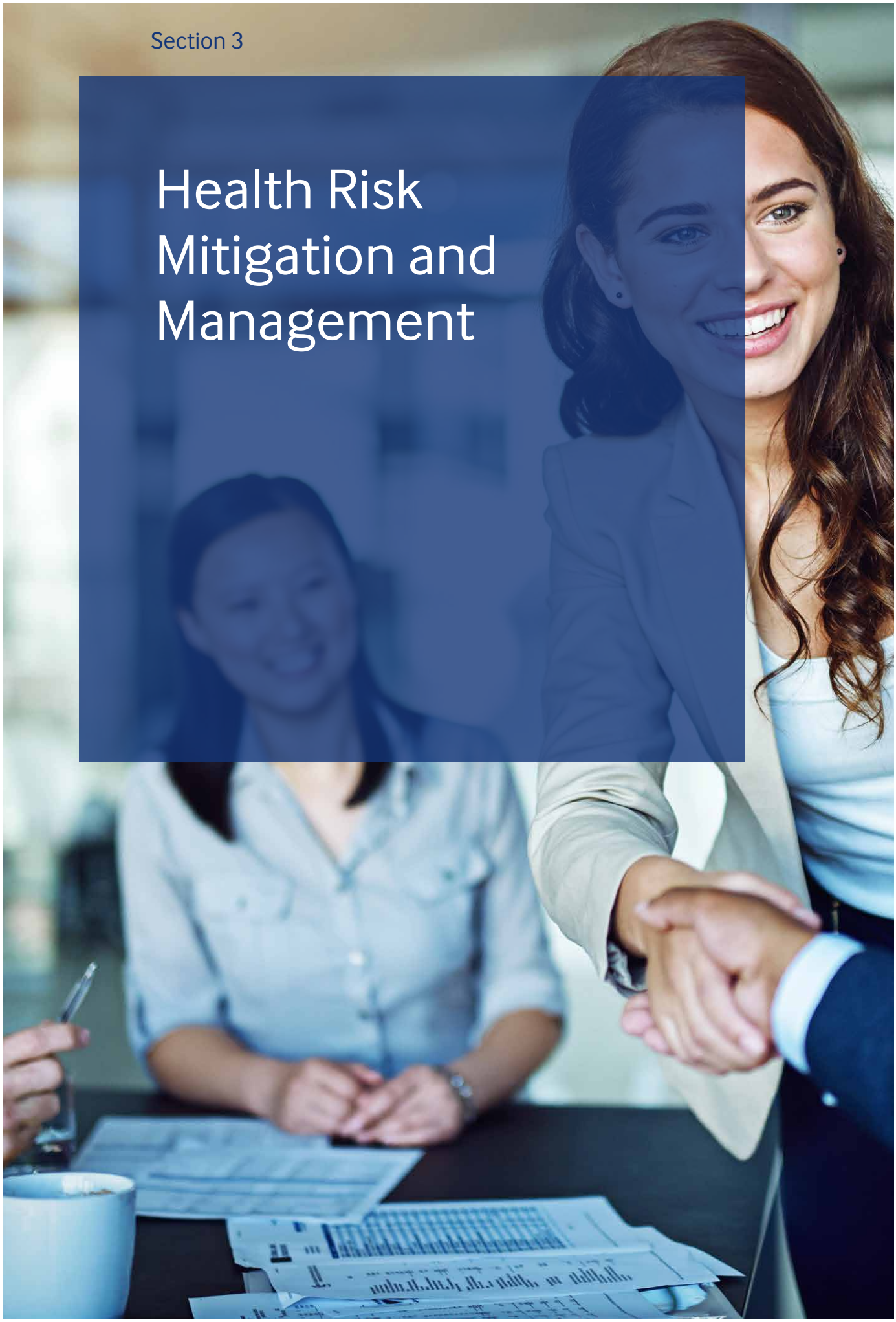
Using the myriad methods for data gathering and analysis, Occupational Health programmes should complement industrial hygiene risk assessments to identify health hazards, control and monitor worker exposure to health hazards, protect the health of employees, and prevent occupational illnesses and injuries.

2.2 HEALTH IMPACT ASSESSMENT (HIA)

A Health Impact Assessment is a systematic evaluation of the potential for business activities, usually project development, to impact the health of the surrounding host community, i.e., outside the fence line or work/project site. Detailed guidance on this important health assessment process can be found in IOGP-IPIECA 548 - *Health impact assessment - A guide for the oil and gas industry.*

Section 3

Health Risk Mitigation and Management

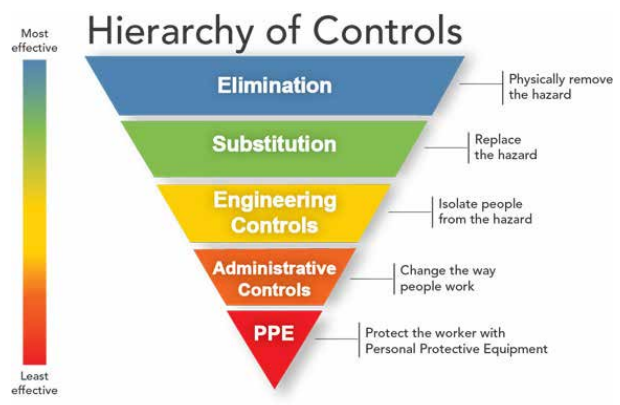


Health Risk Mitigation and Management

As described in the second part of this guide, each work location and person has their own unique health risks and challenges. These can be influenced by the nature of the work, the baseline health status of a person, medical history and health behaviour, personal protective measures, the environment in which they are working and the presence of specific endemic diseases, amongst others. To deal with these risks, barriers can be put in place to mitigate the occupational risk, as well as processes to manage it. For these barriers to be effective they need to be designed and managed by competent staff. Effective barriers require commitment from business and frontline leaders beyond the HSE professionals, as well as the workers themselves.

3.1 HIERARCHY OF CONTROLS AND MITIGATION CATEGORIES

Once health risks have been adequately identified, there are often numerous mitigation actions/barriers possible. The hierarchy of controls can be used to choose the most effective barriers. The hierarchy ranks the barriers from most to least effective. Determining which barrier is best suited to mitigate a risk follows an ALARP (as low as reasonably practicable) determination to identify the highest feasible level of the barrier for a specific risk.



Hierarchy of controls:[8]

1. Eliminate the hazard
2. Substitute the hazard
3. Isolate/separate the hazard
4. Use an engineering solution to manage (exposure to) the hazard
5. Organise work to manage (exposure to) the hazard
6. Use procedures to manage (exposure to) the hazard
7. Use of personal protective equipment (PPE); as the last barrier, extra care should be taken to verify and document the effectiveness of this barrier where used

Since most, if not all, barriers ultimately depend on human actions for their effectiveness, the assessment and implementation of barriers as above requires specialist input. For this reason, these assessments and implementation of controls needs to be performed by competent staff, who are specialised in one or more of the disciplines below and have a working knowledge of all of them.

- Industrial hygiene – used to measure, manage and control (common) hazards such as noise, chemicals, water quality, vibration, H_2S operating exposure limit, etc.
- Health - covering occupational, preventive, public, and environmental health from both the physical and mental health perspectives.
- Human factors and human performance - the field specialising in understanding the physical and phycological factors of facility and process design that influence human performance and their variability/ reliability, which in turn can degrade or impair barrier performance.

The following paragraphs will discuss some specific and common risk mitigation activities performed by professionals in these disciplines.

[8] National Institute for Occupational Safety and Health, Center for Disease Control and Prevention. 'Hierarchy of Controls'. https://www.cdc.gov/niosh/topics/hierarchy/default.html

3.2 FITNESS FOR TASK

In the oil and gas industry, there are many tasks in which the health of an individual could have an impact on the safety of a task being conducted, could worsen a pre-existing condition the individual may have, or lead to new illnesses due to pre-existing vulnerabilities. Any individual who is unable to complete a task safely places themselves and others at risk. It is not surprising, therefore, that over the years, many employers have sought to reduce this risk through a 'fitness to task' assessment process.

For the purposes of this document, this assessment relates to the process of assuring to the greatest extent possible that an individual's health allows him/her to complete a task safely and without unacceptable risk to themselves, their employing company or a third party.

This type of assessment is most frequently used before an employee or contractor starts his/her job (pre-placement) but is equally important to assess the changes in fitness after a period of illness (return to work assessment). Similarly, these types of assessment can be useful, prior to travelling to a high risk or remote location (fitness for assignment/ travel) where the consequences of illness or injury might be more severe due to limitations in care provision.

For more detail see IOGP-IPIECA 470 - *Fitness to work. Guidance for company and contractor health, HSE and HR professionals.*

3.3 HEALTH SURVEILLANCE

Health surveillance is closely linked to fitness for task and is used as a tool to assess the continued fitness of staff for their tasks. It can be conducted to monitor changes over time in the health of employees who are exposed to one or more specific health hazards such as noise and exposure to benzene, for example. This surveillance functions both as an early indicator of developing occupational illness, as well as a tool to monitor the effectiveness of control measures, such as PPE.

3.4 WORKER WELFARE AND WELLBEING

The welfare and wellbeing of all workers has a significant impact on their work engagement. Higher engagement levels, in turn, have shown to be positively correlated with worker health and overall HSE performance, making 'worker welfare' an effective health risk mitigation activity. Safety performance, working efficiency, and effectiveness have all been shown to be positively affected by increasing worker welfare. Moreover, these factors together are important determinants of overall asset performance or project delivery and can influence the business performance and thus the bottom line.

Addressing good welfare arrangements should be achieved by evaluating the quality, comfort, and appropriateness of worker accommodation[9] (including food and sanitary facilities) from design to maintenance and on-going management until facility end of life/replacement. Optimising access to quality healthcare, providing recreational facilities, internet connections that have the capacity to allow workers to call home, instituting site-specific worker welfare committees, seeking input from workers for fair grievance resolutions, and assuring that work rosters balance work and leisure time are some additional methods of welfare arrangements for a workforce.

In addition to the above, other factors to consider when designing worker welfare facilities and well-being programmes are gender, religious and other beliefs, culture, language, and dietary norms.

Besides physical health, there is a strong need to address workers psychological health and wellbeing. The pressures people are exposed to and the volatility of the oil and gas industry increasingly tests the resilience of staff to deal with this. Therefore, providing staff with strategies and access to psychological support systems to improve their resilience and mental and psychological performance, has proven to be an effective way to address these challenges, allowing them to perform at their best.

[9] See IOGP guides 541 - *Temporary onshore accommodation - Selecting the camp type* and 542 - T*emporary onshore accommodation - Design, layout, accommodation, facilities and services*, which lay out guidance in more detail

3.5 WASTE MANAGEMENT, FOOD AND WATER SAFETY

In extremely remote settings, food and water safety can present unique challenges in field operations. During construction phases, groups of workers often live in temporary, mobile camps where kitchen facilities are continuously built and dismantled leading to significant risk to workers of both morbidity and mortality from microbial, chemical, and physical contamination of the food and water supply. In addition, there is substantial company reputational risk associated with insufficient food and water safety planning. Food and water-related illnesses can often be extensive and have the potential to shut an operation down. Besides maintaining drinking water quality, effective wastewater management is vital to maintaining food and drinking water safety. Details on sewage treatment and sanitation activities can be found in Appendix 2.

For further guidance on how to organise a food and water safety management programme see IOGP-IPIECA 397 - *A Guide to Food & Water Safety*. Requirements and standards for food and water safety need to be included in tenders from all suppliers of goods and services pertaining to food and water. The standards should benefit all personnel on site, including contractors.

3.6 OCCUPATIONAL HEALTH

Once occupational exposures have been identified through the risk assessment, specific programmes, services, policies and procedures should be designed and implemented, using recognised techniques and tools, to eliminate/control and monitor the exposures to risks to health. The purpose of occupational health interventions is to promote and maintain the highest degree of physical, mental, and social well-being of workers – in all occupations – by preventing poor health, controlling risks, and adapting work to people. Access to occupational health should be ensured for the entire workforce (depending on local legislation, this might need to be provided by each employer to their own employees).

Occupational health programmes should complement health risk assessment and ongoing assessment of workplace hazards to identify health hazards, control worker exposure, protect the health of employees, and prevent occupational illnesses and injuries.

An occupational health-care facility may be set up to provide the following:

- infectious diseases surveillance of employees hired locally or from outside the region
- immunisations
- evaluation of health aspects of catering, living accommodation, waste disposal and water testing
- support for evaluation and management of occupational health risks
- arrangements for first-aid and training
- conforming to local occupational health legislation
- briefing new arrivals on local health risks
- fitness for task, rehabilitation and return to work assessments
- case management, health surveillance, health risk awareness and training
- support for human resources employment policies and procedures
- support for initiatives around welfare

In some locations it may be sufficient to appoint a local doctor as an occupational health practitioner for the workforce, whilst in other locations it may be necessary to bring in expatriate medical staff to provide occupational health support. Whenever possible a nurse, medic, or doctor should be able to provide occupational health services as well as medical emergency response (see next section).

Clinical health surveillance/infectious diseases surveillance should be the responsibility of a doctor who has knowledge of preventive health care, ideally in the relevant occupational health setting. A clinical nurse working directly under the supervision of such a doctor can carry out some of the procedures.

Legislation regarding immunisations and their administration varies from country to country. Usually, a nurse may give immunisations provided that they are acting under the written direction of a doctor who has assessed the nurse's competence to immunise and deal competently with any adverse reactions.

Evaluation of the health, hygiene and welfare aspects of catering, living accommodation, waste disposal and water testing should only be done by a doctor, nurse or other occupational health professional that has sufficient knowledge and experience to perform the task in a competent manner; similarly, support for the evaluation should only be performed an experienced and competent health professional.

Support for the evaluation and management of occupational health risks should only be performed by a health professional that has sufficient knowledge and experience to perform the task in a competent manner.

3.7 FATIGUE RISK MANAGEMENT

Fatigue is one of the largest risk factors in the oil and gas industry, playing a role in a significant number of incidents and near misses. Fatigue impairs human performance in a manner similar to alcohol.[10] An organisation or entity should therefore establish a Fatigue Risk Management System (FRMS), i.e., a risk-based plan or system of controls that identifies, monitors and manages fatigue risk with the aim of ensuring that, as far as reasonably practicable, employees are performing with an adequate level of alertness.

An FRMS should be risk- and evidence-based, but grounded by operational experience and practicalities and integrated into existing corporate safety and health management systems.

The four principles that underpin an effective FRMS[11] are:

1. The FRMS should be customised to the operation for which it is developed.
2. The FRMS should be based on assessed risk and evidence.
3. The FRMS should be built on the principle of shared responsibility.
4. The FRMS should be integrated into existing management systems.

See IOGP-IPIECA 626 - *Managing Fatigue in the workplace* for more detail.

3.8 DRUGS AND ALCOHOL MISUSE MANAGEMENT

Substances of misuse include alcohol, illicit drugs, inappropriate use of over-the-counter and prescription medicines and other substances that have the potential to impair health, behavior, judgement or job performance. It is recognised that safety, company reputation, and financial performance can be put at risk by a person or persons whose judgement has been impaired by substance misuse. Consequently, dealing with misuse issues requires a well-defined policy and programme that ranges from identifying the issues to testing and consequence management. IOGP-IPIECA 575 - *Oil and gas contractor drug and alcohol testing guidelines* provides guidance on implementation of these types of programmes.

3.9 LOCAL ENVIRONMENTAL, EPIDEMIOLOGICAL AND SECURITY FACTORS

When assessing health risk and planning for work activities, there is a myriad of external factors that influence the health and wellbeing of staff.

Extreme cold and heat are increasingly common work environments for oil and gas operations. Dealing with these risks by managing exposure through work programmes, including hour control, work-rest regimes, appropriate shelter, and the provision of PPE are effective ways to address this challenge. More detail about how to manage these environmental factors and their impact on health can be found in IOGP-IPIECA 398 - *Health aspects of work in extreme climates*.

Often in relation to the environmental circumstances, different infectious disease patterns will be seen. Malaria is a well-known example of this, however many more location-specific health risks are present. Local health risks could include illnesses such as tuberculosis, which has been re-emerging over the last two decades and has become increasingly resistant to existing treatment (see IPIECA-IOGP 394 - *Managing tuberculosis*) and the increasing challenge of managing latent tuberculosis in local workers, especially in HIV endemic areas.

Barriers ranging from vaccinations to health screenings and bed nets are important measures to put in to place and more opportunities can be identified based on the Health Risk Assessment.

Lastly, the effectiveness of a health management programme cannot be separated from the risk associated with corporate and local security risks. The effectiveness of any health management system can be severely undermined if the security factors affecting it are not considered. Cybersecurity risk around private medical files is increasingly challenging and has the potential for severe personal and corporate consequences. Fines for data privacy breaches, for example, can cost a business a significant portion of their revenue. At the local level, the physical security questions also need to be addressed directly with local security management staff. For example, where access to a local hospital can be prevented or delayed due to security risk, mitigation in the form of an increased remote health care capability can be a solution.

[10] Sleep Health Foundation. 'Fatigue as an Occupational Hazard'. Blacktown. 2013. https://www.sleephealthfoundation.org.au/public-information/fact-sheets-a-z/fatigue-as-an-occupational-hazard.html. (Accessed 16 August 2018).

[11] Energy Institute. 'Managing fatigue using a fatigue risk management plan (FRMP)'. London, 2014. (Accessed 16 August 2018).

3.10 PANDEMIC PLANNING & INFECTIOUS DISEASE OUTBREAK MANAGEMENT

Some (emerging) diseases pose a risk to operations at a regional or global level. Large scale outbreaks such as SARS (2003), Ebola (2014-2015) and Zika (since 2016), are recent examples. These outbreaks can quickly outstrip the resources available within an organisation or country. Infectious diseases are likely to continue to re-emerge and therefore disease outbreak programmes (e.g., Pandemic Plan or Infectious Disease Outbreak Management Plan) need to be developed as a precaution. Business Continuity Planning (BCP) and Community Engagement Plans are important elements of these programmes. As part of these plans, it is important to recognise that outbreaks can pose a significant emotional and psychological challenge to those affected. Planning for this and providing adequate psychological support should be integrated in the overall contingency planning.

The annual flu epidemic similarly has the potential to be disruptive to business, and the right health campaign, with appropriate planning, can minimise both the risk and the negative effects.

Section 4

Healthcare delivery

Healthcare delivery

Whereas effective hazard identification and risk management can help prevent most negative health consequences, occasionally emergency medical care and response structures are still needed.

Delivery of healthcare services is determined by the identified health risks and the likely medical (emergency) scenarios. Further adaptation is based on the capability of local medical resources/infrastructure and local laws and regulations. Medical emergencies and multiple casualty scenarios constitute the most significant risk and are addressed in this section.

4.1 MEDICAL EMERGENCY MANAGEMENT

A medical emergency is a situation in which, due to an acute illness or injury, there is an immediate risk to a person's life or long-term health. The provision and organisation of resources dedicated to medical emergency response, should aim to achieve the best health outcomes in relation to time.

To manage medical emergencies, each location should develop a site-specific Medical Emergency Response Plan (MERP). This should consider the potential for individual and multiple casualties, describing the response to various medical emergency scenarios based on the health risk and local medical resources assessments, with allocated availability of capable resources. The MERP should consider specific needs related to the work activities and the general medical capability available in the country/location in which these activities are carried out, as well as any collaboration with local health authorities.

Emergency healthcare outcomes

The overall purpose of a medical emergency response plan is to have arrangements in place to positively influence the outcome of potential health emergencies that could result in permanent disability and loss of life. To do this, several consecutive tiers make up an emergency response.

Tier 1: The first response - basic life-saving support

During the initial moments (within 4 minutes) after an accident or medical emergency has happened, there are often a few, relatively simple, potentially life-saving first aid interventions that can be done such as CPR, stemming severe bleeding, etc. These interventions are only useful if done immediately, and can be delivered by trained first aiders. Once the Tier 2 responder is with the patient, the first aider can continue to support them in delivering Tier 2 level of care.

Tier 2: Delivering advanced life-saving health interventions

Patient outcomes can be improved by providing more advanced intervention (chest tubes, intravenous lines, etc.) and medication. The required competence level for these interventions is higher than that for Tier 1 and will almost always require a health professional on site with advanced life support skills. The use of remote healthcare technology can support the delivery of this care by linking the on-site medic or in some cases even first aiders, to a medical specialist who can steer the treatment to improve the outcome. Tier 2 responses are most effective when provided as soon as possible after the start of the emergency.

Tier 3: Providing hospital level care

As with Tier 1 and 2, Tier 3 is focussed on stabilisation of the patient, but also on starting recovery by addressing the underlying cause of the emergency. For example, Tier 3 would be surgery for appendicitis or a plaster cast for a broken arm. Ideally this level of care is provided at a hospital or advanced care clinic. In cases where this level of care is not available locally, or transportation to a providing facility are not always available, remote healthcare technology or telemedicine can assist in decision making on when to access a hospital and manage the case in place if needed.

Tier 4: Definitive care

In some emergencies, individuals will require specialised care (such as neurosurgery or cardiac stenting) that is not always available in local clinics or hospitals. Under these circumstances, secondary and tertiary level hospitals need to be identified that can fulfil this role. These Tier 4 facilities might be far away and possibly in a different country from the site of the emergency, depending on their remoteness and the locally available Tier 3 services. Identification of these facilities and medical transportation should be assessed and documented in the MERP.

Competence requirements per Tier

The four tiers described above require different levels of competence to be effective and efficient. There are generally three groups of medical emergency responders that are required for a full medical emergency response. The exact level of competence as well as the positioning of these groups is dependent on the nature, location, scale, and duration of the work activity and the resources available at site.

It is important to note that on-site health staff may have this function only as part of their role. Medical emergencies

will constitute a minority of their work and consequently the health professionals that are on site should also be competent in hazard identification, risk mitigation, health system management, preventive care and welfare, as described in the introduction of this guide.

Level 1: First aiders

First aid is the immediate application of Tier 1 treatment following an injury or sudden illness, using facilities and materials available at that moment and that location, to sustain life, prevent deterioration of an existing condition and promote recovery.

The content and duration of training courses and the titles given to trained first-aiders vary widely from country to country and even between training institutions within the same country. Assessment of a first-aider's qualifications will require scrutiny of their training, experience, and references. First aiders should carry a valid recognised certificate of first-aid training which should meet internationally recognised standards.

The number of first-aiders and their level of competence will depend on both the size of the exposed workforce and the degree of risk. Thus, a two-man team operating in a remote or high-risk location may require one member to have basic first-aid capability and the other to have more advanced skills related to the health risks of the work activities, e.g., use of electrical equipment. In contrast, a team of 25, operating close to high-quality medical facilities with good means of communication and evacuation, may require only one basic first-aider. In addition, certain countries may have national guidelines stipulating the numbers of first-aiders required for a given numbers of workers.

Level 2: Health professionals

These are individuals whose primary job is healthcare and medical emergency response at the (remote) site who cover Tier 2 response. In some cases, at remote locations they can also provide Tier 3 response depending on the on-site/near-site medical arrangements, such as remote, topside medical support.

They have specialised training in emergency care, are accredited by a professional organisation that complies with international standards, and are usually employed and experienced in remote field operations to manage medical emergencies with topside support from an experienced emergency doctor.

Depending on the size of the site, these health professionals may be assigned to a specific role, e.g., ambulance medic or project/asset medic.

Level 3: Advanced health professionals

Tier 3 and 4 responses should be delivered by medical and health specialists — personnel who have undertaken postgraduate medical/health training and obtained further appropriate qualifications, and whose competence has been certified by a diploma or a degree granted by an appropriate specialist medical/health college. They work as specialists in hospitals and would be expected to assess, diagnose and treat specialised and complex medical conditions.

4.2 INFRASTRUCTURE AND EQUIPMENT REQUIREMENTS

To be able to deliver the desired outcomes the right combination of competence, facilities, medical and communication equipment, medication and transportation is required. Below is a short description about these equipment requirements per Tier, with some additional information on the opportunity to use remote healthcare technology in the accompanying boxes. The last part of this section focuses on pharmacy management.

Tier 1: At the incident site

In the event of an incident, first aid needs to be provided as soon as possible and therefore should always be accessible at, or very near, the site of the emergency. A seriously ill or injured patient should not be moved immediately, unless the environment in which the incident happened is unsafe, e.g., when there is a nearby fire or H_2S exposure.

Medical equipment that should be readily available (within minutes) includes Automated External Defibrillators (AEDs) and first aid boxes (see appendix 4).

When specific hazards have been identified that would require immediate medical treatment, for example Hydrofluoric acid (HF) exposure requiring calcium gluconate, this should be added to the equipment/medication available to the Tier 1 responder. The first aider fulfilling this role should be provided with adequate training to obtain competence in handling this equipment and/or medication.

Remote healthcare technology for Tier 1

The increasing availability of real-time audio and video connections makes it possible to establish a connection between the first aiders and a health professional who can advise on and oversee treatment of a patient.

Tier 2: At the incident site and in an on-site health facility

The attending health professional(s) will decide when it is safe to move the patient to a location or facility where care can be provided in a more controlled environment and where additional medical equipment and medication is present. This could be a sick bay on a ship or a site clinic at a larger asset.

Remote healthcare technology for Tier 2 and 3

Tier 2 and 3 responders will be able to provide more advanced treatments such as chest drains, sutures or thrombolysis, as well as more advanced diagnostics, than Tier 1 personnel. The diagnostics in particular are needed to more accurately predict the risk and benefits of a treatment such as thrombolysis (treatment for some heart attacks) and to be able to make an appropriate treatment plan. This planning includes the question of moving a patient from a remote location or not. Remote healthcare allows for these decisions to be made with support of a team of medical professionals who are offsite. Lab results, ECGs (electrocardiography), stethoscope examinations, ultrasound examination, and even EEG (electroencephalography) based brain scans to diagnose strokes are available in portable form (often linked to a smart phone) and able to be transmitted real time. Using this type of technology will bring part of a hospital's abilities to the patient, when the patient is too far away from a hospital or too unstable to move.

Tier 3: External clinic/hospital or on-site health facility/ clinic

Whenever possible, the Tier 3 response should be provided by a hospital and only in exceptional situations, such as extreme remoteness of the operational site, can it be replaced by an advanced on-site clinic, equipped with remote healthcare technology.

Assessing a hospital's capability in terms of competence and equipment/facilities available, should be undertaken prior to operations commencing and when appropriate the hospital needs to be aware of any specific hazards related to the operations. More information on undertaking hospital assessments can be found in IOGP-IPIECA 588 - *Medical facilities assessment: checklist for health professionals in the oil and gas industry.*

Medical equipment and pharmacy management

A systematic approach to the management of medical equipment should be taken to minimise the risks associated with its use. This should include the purchasing, leasing, deployment, maintenance, repair, and disposal of medical equipment. It is essential that whenever an item of medical equipment is used, it is:

- suitable for (and only used for) its intended purpose
- used in accordance with manufacturers' instructions
- properly understood by the professional user, i.e., staff should be appropriately trained and competent
- maintained in a safe and reliable condition
- recorded on a database
- selected and acquired in accordance with the company's recommendations
- disposed of appropriately at the end of its useful life

A complete description of the requirements of a comprehensive medical equipment management system is beyond the scope of this guideline document. See Medicines and Healthcare products Regulatory Agency (MHRA) website for more information on this subject[12] (See Appendix 4 for additional detail).

Pharmaceutical inventory management

Pharmaceutical and inventory management is, in principle, the same in remote locations as in medical facilities in more accessible locations, though logistics and cold chain management may be more challenging in remote ones.

A cold chain is a temperature-controlled supply chain, which aims at maintaining the product at a given temperature range, thus extending and assuring the shelf life of pharmaceutical drugs and vaccines.

One common temperature range for a cold chain in the pharmaceutical industry is from 2° to 8°C, but the specific temperature (and time at temperature) tolerances depend on the actual drug or vaccine being transported. Remoteness, hot climate and customs delays pose well-known risks in relation to keeping the cold chain unbroken.

[12] Medicines and Healthcare products Regulatory Agency (MHRA), United Kingdom Department of Health and Social Care. https://www.gov.uk/government/organisations/medicines-and-healthcare-products-regulatory-agency

Some common ways to achieve an unbroken cold chain include the use of refrigerated trucks, specialised packaging and temperature data loggers, as well as carrying out a thorough analysis, including taking measurements and maintaining documentation.

At some geographical locations, the type and availability of controlled drugs, as well as the definition of what constitutes a 'controlled drug', may vary. However, whilst this is 'business as usual' for most companies, local legislation related to controlled drugs must be respected to ensure that the correct procedures are in place for the receipt, storage, record keeping, and disposal of such drugs.

It is important to ensure that labelling, instruction leaflets and procedures relating to pharmaceuticals match the language competence of the staff handling the medication. All pharmaceuticals on site should be stored securely with regular periodic checks of stock. It may be better to have a good standard inventory which is well known to staff than to add on more advanced drugs with which staff are unfamiliar.

Medical services are often supplied by medical service providers or contractor companies. Where this is the case, the operator company must include pharmaceutical-related issues in their risk assessment and follow-up, e.g., non-availability of controlled drugs or motion sickness medication.

4.3 COMPLEX MEDICAL EMERGENCIES

Occasionally, more complex medical emergencies will occur that involve multiple people or require transfer over a longer distance – a medical evacuation. The medical emergency may also be the increased risk posed by an outbreak of an infectious disease threatening the work site.

Multiple casualties

Major industrial accidents are sudden, unexpected industrial events with significant impact to people, the environment and infrastructure. These catastrophic societal events commonly result from major chemical releases, nuclear emissions, fires, and explosions resulting in multiple casualties and loss of lives in a way that overwhelms the day-to-day medical resources available at the workplace. It is unlikely that the worksite will possess all the medical resources necessary for handling major accidents. Additional resources are most likely to be sourced through collaboration with the local hospitals, and local emergency agencies (e.g., police, fire department, civil defence, and ambulance services).

The capabilities of these partners may also be overwhelmed during these crises. A number of large industry players have chosen to work together with the local health authorities and upgrade local hospitals' capability through the companies' social investment programmes. In addition to improving their ER plans, such demonstrations of corporate social responsibility (CSR) have been shown to help enhance the companies' reputation in their communities and host countries. In some countries, different companies working in the same area formed mutual aid arrangements, with the aim of lending each other assistance during a disaster. Further information on multiple casualty planning can be found in IOGP-IPIECA 578 - *Multiple casualty planning and preparation.*

Medical evacuation

When Tier 3/4 level facilities are not available locally or in country, and remote healthcare technology cannot deliver the required care to the patient, a medical evacuation (medevac) to an appropriate medical facility may be required. A medevac may be undertaken using various transportation modes (e.g., helicopter, boat, off- road vehicle, or a crew change flight). The term "medevac" is not restricted to those where air transportation is used, or to those where a health professional provides medical support during transfer.

The scenarios that could lead to a medevac need to be identified and arrangements put in place before an emergency occurs, to avoid unnecessary delays. Medevacs can have negative consequences on the health of a patient and the benefits of moving the patient need to be carefully weighed against the disadvantages (see Appendix 3 for more detail).

4.4 MEDICAL EMERGENCY RESPONSE PLANS

Based on the identified hazards and risks (occupational and environmental), combined with the available resources and local circumstances, a Medical Emergency Response Plan (MERP) should be created that integrates the different components of the response to achieve the desired outcomes.

The medical emergency response plan should:

- be risk, scenario, and location-based (e.g., pandemic, food-borne illness outbreak, infectious diseases such as varicella and influenza-like illnesses), and should include multiple casualty planning
- identify the designated health/medical providers (whether part of the company or contractors) involved in the plan, together with their capabilities and limitations (these providers could be under the direct control of the company or a third party; if the latter, a formal agreement on the level of medical support should be made)
- determine the likely evacuation route(s) and means of transport from the incident location to the place of medical care—particular attention is required regarding transportation limitations (e.g., distances, mode of transport, weather limitations, etc.) and consideration should be given to requirements for local authority/government authorisation prior to evacuation out of the country
- include contact details for key personnel
- include contact information for all individuals who are covered by the MERP—such persons should be advised that they must have a valid passport and appropriate visa in case evacuation out of the country is required

To be effective, the MERP should be:

- developed systematically before the start of any activity
- communicated effectively and be well understood
- designed so that important actions are taken in parallel (different actions should be taken at the same time) and not in series (actions should not be taken one after the other)
- integrated into the company's general emergency response plans
- under the responsibility of line management
- organised in collaboration with both company and client health-care professionals where subcontractors are involved
- tested and reviewed regularly through structured drills

Impact of medical emergency on staff and organisation

Depending on the nature of a medical emergency, there can be long term physical and psychological consequences for those directly affected by the emergency, those responding to it and those who witnessed it. It is important to provide supporting resources to those who need them, for example by establishing an Employee Assistance Programme (EAP), and providing workplace support to accommodate the return to work of the injured or ill person. For responders and witnesses, Critical Incident Stress Management (CISM) has been proven to be an effective tool to manage the risk of long term psychological effects.

Drills, review and revision

Once the MERP has been developed it should be practiced regularly and should include testing of all logistical support required (such as communications and transport). The results of drills should be reviewed, and the plan revised if necessary.

The extent of resource deployment during drills should be predetermined by management and company-designated healthcare professionals. This should include scenario planning, as well as simulated events addressing triage for multiple casualty situation, followed by a thorough debriefing.

A debriefing should be conducted after each drill or real-life use of the MERP so that the company can make improvements if necessary.

Finally, the MERP should be audited and revised if necessary, at least annually and following any significant change in circumstances, e.g., type of operation, location or health-care resources.

Where suitable, contractor companies should develop their own MERP, compatible with that of the client company. Alternatively, the company may include contractors in its own MERP but this must be formally established prior to the start of operations, particularly for medical evacuation, access to medical facilities and billing.

Abbreviations

AED: Automated External Defibrillator

ALARP: as low as reasonably practicable

CSR: Corporate Social Responsibility

ECG: Electrocardiography

EEG: Electroencephalography

FRMS: Fatigue Risk Management System

HRA: Health Risk Assessment

HSE: Health, Safety & Environment

IH: industrial hygiene

ISO: International Organisation for Standardisation

MERP: Medical Emergency Response Plan

MHRA: Medicines and Healthcare products Regulatory Agency

OMS Framework: Operating Management System framework

PDCA: 'Plan-Do-Check-Act'

WHO: World Health Organization

Glossary

Clinical governance	The systematic approach to maintaining and improving the quality of patient care within a health system.
First responder	A term used to refer to the first person to arrive at an emergency scene.
First-aiders	An individual trained to provide the initial care for an illness or injury, usually to a sick or injured person, until definitive medical treatment can be accessed.
Fitness for Task assessment	Specified assessment of a person's fitness to perform specific tasks that have been identified as carrying risks that could harm the health of themselves, others or the integrity and safety of operations.
Health management system	A process that applies a disciplined and systematic approach to managing health in company activities.
Health records	Any information pertaining to the medical or occupational assessment, care, treatment, surveillance or other intervention related to the health of the individual.
Health-care system	A complex of facilities, organisations and trained personnel engaged in providing health care within a geographical area.
Hierarchy of controls	Controlling exposures to occupational hazards is the fundamental method of protecting workers. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective control solutions.
Industrial/occupational hygiene	Is the science of anticipation, recognition, evaluation, prevention and control of hazards arising in or from the workplace, and which could impair the health and well-being of workers, and considering the possible impact on the surrounding communities and the general environment. Occupational hygiene uses science and engineering to prevent ill health caused by the environment in which people work and has an important interphase with health.
Medical emergency response plan (MERP)	A site-specific emergency response plan for dealing with injury or illness to a worker.
Medevac	Medical evacuation.
Occupational disease	Any illness associated with a particular occupation or industry.

Occupational health	Occupational health deals with all aspects of health and safety in the workplace and has a strong focus on primary prevention of hazards. The health of the workers has several determinants, including risk factors at the workplace leading to cancers, accidents, musculoskeletal diseases, respiratory diseases, hearing loss, circulatory diseases, stress related disorders and communicable diseases and others.[13]
Occupational health hazard	The potential to cause harm to health. Health hazards may be biological, chemical, physical, ergonomic, or psychological in nature.
Occupational health service	A service established in or near a place of employment for the purposes of: • protecting the workers against any health hazard which may arise out of their work or the conditions in which it is carried out • contributing towards the workers' physical and mental adjustment, in particular by the adaptation of the work to the workers and their assignment to jobs for which they are suited • contributing to the establishment and maintenance of the highest possible degree of physical and mental well-being of the workers
Remote Healthcare (technology)	Healthcare delivered in remote locations that cannot assure access to Tier 3 level care in any or all situations, using technology specifically designed to bring advanced medical capabilities to these remote locations.
Strategic health management	Systematic, cooperative planning throughout the project life cycle to maintain the health of the workforce and promote lasting improvements in the health of the host community.

[13] World Health Organization. 'Occupational Health'. http://www.who.int/topics/occupational_health/en/

Appendix 1: Main components of a health system

For an overview of the opportunities that health management provides to businesses, please read Appendix 1 in combination with the Executive Summary. Together, these highlight the main components required to deliver health services in an organisation.

Main components of a health system

Managing Health Services

- Based on the Operating Management System (IOMS; OGP 510 - *Operating Management System Framework for controlling risk and delivering high performance in the oil and gas industry*) an integrated health management system should enable a company to optimise health and wellbeing at their sites and to organise the right mix of professionals, equipment and other resources in order to achieve the desired health and business outcomes.
- Outcomes depend on: (1) Leadership, (2) Risk Management, (3) Continuous Improvement and (4) Implementation and should address the scope of work, competence requirements, reporting, assurance and data privacy/records management.

Health Risk Assessment and Opportunities

- The purpose of a Health Risk Assessment (HRA) is to provide the necessary information and understanding of health risk to prevent acute and chronic health effects to the workers in that work location.
- Major risks include: injuries, illness, food born illness outbreaks, fatigue, extreme heat/cold, psychological hazards and stress, infectious disease, etc. These risks change over time and need to be frequently reassessed by competent staff.

Health Risk Mitigation and Management

- Following the hierarchy of controls methodology, major risk mitigation activities are: (1) fitness for task assessment, (2) health surveillance, (3) worker welfare and wellbeing, (4) waste water management, food and water safety, (4) occupational health, (5) Fatigue Risk Management, (6) Drugs and alcohol misuse management, amongst others.
- Mitigation of health risk is not exclusively the task of health professionals, and requires active involvement of all staff and collaboration with other parts of the business such as HR and Real Estate.

Healthcare Delivery

- Response to (acute) injury and illness relies on a tiered response involving first aiders, health professionals embedded in the business and external medical services such as hospitals and clinics.
- In remote locations the reliance on imbedded staff increases and becomes more high risk. This risk can be mitigated by using remote healthcare technology.
- The effectiveness of the Medical Emergency Response (MER) system depends on the competence of staff, the available medical resources, the flexibility of the plan to deal with large and small emergencies. Frequent drills on diverse scenarios are essential to assure this effectiveness.

Appendix 2: Sewage and sanitation

Sewage and sanitation

Sanitation

Disease-causing organisms, including viruses, bacteria, and eggs or larvae of parasites may all be present in human faeces. These microorganisms may enter the body through faecal-contaminated food, water, eating and cooking utensils, and by contact with other contaminated objects.

Diarrhoea, cholera, and typhoid are spread in this way and are major causes of sickness and death. Some fly species and cockroaches are attracted to, or breed, in faeces. High fly densities will increase the risk of transmission of trachoma and Shigella dysentery. Intestinal worm infections (hookworm, whipworm, and others) are transmitted through contact with soil that has been contaminated with faeces, and may spread rapidly where open defecation occurs and people walk barefoot.

Facilities for disposing of excreta must be designed and built to avoid contamination of water sources that will be used for drinking-water. Any successful measure for managing human excreta includes the principles of separation, containment and destruction. Whatever form of sanitary facilities and sewage system is designed and built, they must fulfil these three functions to minimise health risks.

To ensure a sustainable solution, it is important to take into account local custom as well as the availability of water. Some field operations may need to have several solutions in the same camp, e.g., simple screened cubicles with concrete slabs and pour-flush toilets, as well as Western-style water closets/toilets. Hand washing facilities should always include hot and cold water, liquid soap, disposable towels and foot-pedal operated or other non-touch, lidded disposal units. Posters or other information on the importance of hand washing should be available.

Communal facilities should be of a sufficient number and be regularly cleaned by staff who are adequately trained and equipped. Clean sanitary facilities help to encourage proper use of the facilities; dirty sanitary facilities inevitably lead to carelessness and unsanitary defaecation practices in and around them. Routine inspection by supervisors is necessary to ensure that cleaning standards are maintained.

Sanitary facilities should be sited no more than 50 metres from users' living quarters, to encourage their use, but sufficiently far away (at least 6 metres) to reduce problems from odours and pests, as is the case with sewage facilities.

Sullage

Wastewater from kitchens, bathrooms, and laundries is called sullage. It can contain disease-causing organisms, but its main health hazard is when it collects in poorly drained places and causes pools of organically polluted water that may serve as breeding places for Culex and Anopheles mosquitoes. The former transmits some viruses as well as the parasitic disease lymphatic filariasis, the latter malaria.

Solid waste

Rats, dogs, cats, birds, and other animals may be carriers of disease-causing organisms and are attracted to discarded food, clothing, medical dressings, and other components of solid waste. Small rainwater collections in solid waste such as discarded car tyres or oil drums may serve as breeding places for mosquitoes.

Medical waste from field site clinics may present a specific challenge and could typically contain the following categories of waste: infectious waste; pathological waste; sharp objects (i.e., syringes, blades, broken glass, etc.); pharmaceutical waste; chemical waste; waste with high heavy metal content; and pressurised containers. The safe and appropriate disposal of medical waste is critical to preventing or minimising the risk of transmitting microorganisms causing potential infections and other hazards as described above.

Storage, collection, treatment and disposal of sullage and solid waste

Management of health risks related to storage, collection, treatment and disposal of sullage and solid waste will depend on the source, quantity and nature of wastewater and solid waste as well as soil, topography, climate and other factors that may determine which options are possible.

Legislation controlling the handling, collection and disposal of medical waste is extensive and varies by country. Sharp items, such as hypodermic needles and syringes, cannulas and surgical blades, should be disposed of in dedicated, sealed after-use containers. Contaminated consumables such as bandages, gauzes, plasters, cotton tampons, surgical dressings and gloves, must be stored separately from non-medical waste and should be disposed of separately as per local laws and regulations, or incinerated. It should be

compulsory for all personnel handling medical waste to use appropriate PPE, such as gloves (disposable and one-time use), face masks (covering the mouth and nose), visor/ protection glasses (for eye protection), and long-sleeve coveralls.

A complete description of the treatment and disposal of sullage and solid waste is beyond the scope of this document.

For further information on the topics in this section, see the references below:

- Water supply and sanitation assessment and programme design[14, 15]
- Solid waste management[16]
- Surface water and waste water drainage[17, 18]
- Management of medical waste.[19]

[14] Wisner, B and Adams, J (eds.). *Environmental health in emergencies and disasters: a practical guide*. World Health Organization Publications: Geneva, 2002.

[15] The Sphere Project, *Humanitarian Charter and Minimum Standards in Humanitarian Response*, 3rd edn. Practical Action Publishing: Bourton-on-Dunsmore, 2013.

[16] United Nations Human Settlements Programme. *Solid waste management in low income housing projects: the scope for community participation*. UN-Habitat Publications: Nairobi, 1989.

[17] World Health Organization. *Surface water drainage for low-income communities*. World Health Organization Publications: Geneva, 1991.

[18] Davis J and Lambert R. *Engineering in emergencies: A practical guide for relief workers*, 2nd Edn. RedR/IT Publications: London, 2002.

[19] Reed R and Dean PT. "Recommended methods for the disposal of sanitary wastes from temporary field medical facilities" *Disasters* 18(4). 1994. p.355-67.

Appendix 3: Guidelines for medical evacuation by ground, air and water

Guidelines for medical evacuation by ground, air and water

General requirements for transportation

- All methods of transportation should be approved for use according to defined company standards and audited on a regular basis.
- The vehicle (ground vehicle, boat, or aircraft) must be compliant with local law, meet local and company safety regulations, and undergo regular maintenance.
- The vehicle must be ergonomically suitable for stretcher recovery work, allowing ease of access for the stretcher as well as the patient escort and equipment.
- Secure storage space for the required equipment and material should be provided.
- A suitable and approved power supply for medical equipment within the vehicle should be provided.
- Adequate interior and exterior lighting and climate control should be available.
- The vehicle operator should be made aware of patient injury or illness, advise on adverse travel conditions and agree to undertake the transport.
- The patient escort must be able to communicate with the vehicle operator, either directly or via a headset link.
- An adequate level of communication between the patient and the patient escort should be maintained throughout the evacuation.
- The patient escort and/or the vehicle operator must be able to communicate with external support.
- The patient escort must have sufficient space to provide care and resuscitation.

General requirements for medical equipment

All medical supplies and equipment dedicated for use within the vehicle should be readily accessible, inventoried, and checked. Note that all electrical medical equipment should have a self-contained power supply.

The following should be available:

- oxygen provided via a variable flowmeter and appropriate masks:
  - rebreatheable bag masks are necessary if 100% oxygen is required
  - normally, a minimum of 3 litres of oxygen is required per patient per minute, however in case of trauma, 10–15 litres are required per minute
- suction equipment
- a mechanism for adequate delivery of intravenous fluids
- splints (vacuum and traction)
- spinal immobilisation equipment and vacuum mattress
- stretchers (which should meet company safety regulations, be securely fastened, and should have a patient restraining harness that can be easily released)
- automated external defibrillator (AED) or defibrillator/monitor
- PPE and methods for safe disposal of clinical waste
- fully equipped 'trauma bag' that contains required medication, fluids, bandages and other medical equipment (see also Appendix 4)

Medical evacuation by ground transport

Ground vehicle standards for medical transport

Recommendations in addition to the general requirements listed above:

- Vehicles should be suitable for stretcher recovery work, doors should open fully to allow free and unrestricted access, and all seats should be fitted with seat belts. Harnesses should be provided to make patients secure.
- The stretcher should be securely fastened to a vehicle anchor point and preferably have locking wheels. It should be possible to load the vehicle with the patient's head towards the front.
- Seating for the patient escort should be available at the patient's head.
- The vehicle should be staffed with a minimum of two people—a driver and a patient escort.
- The driver should hold a current driving licence appropriate for the class and size of the vehicle with a valid appropriate medical assessment.
- The patient escort should be a doctor, nurse, paramedic or first-aider as defined by company procedures.

Medical evacuation by air transport

Medical evacuation by air is a complex and costly process that may require prior company approval. Feasibility of evacuation by air depends upon:

- access to an appropriate medical facility that has agreed to receive the patient
- an appropriate landing zone and transport to the medical facility
- clinical condition of the patient
- weather conditions
- availability and type of aircraft
- landing and flyover clearances
- visa and travel documents clearance

In general, family members will not be allowed to travel with the patient. Medical evacuation by air is normally contraindicated in the following circumstances:

- cardiovascular instability
- non-drained gaseous effusion (pneumothorax, intestinal occlusion)
- recent surgical procedures

Medical evacuation by air normally requires a patient escort. Standards for patient escorts include the following:

- Depending on the complexity and severity of the medical case and the journey time, more than one patient escort may be required.
- Should a doctor, nurse, or paramedic be required, they should have received training in, and be familiar with, the aviation environment and impact on patient physiology in flight.
- In some cases a family member, friend, or colleague may be sufficient. This should be determined by the company-approved health professional in association with the carrier.
- The patient escort must carry sufficient medications to provide for the anticipated needs of the patient during the flight, including additional quantities in case of unexpected delays.
- The patient escort must ensure that all medical equipment has been approved for use on the aircraft concerned. In addition, an approved and dedicated power supply for medical equipment should be available.
- The patient escort should travel in seating adjacent to the patient.

Consideration should be given to connecting flights, transit time, and the requirement of commercial carriers.

Commercial aircraft

Both scheduled and chartered commercial aircraft can be utilised for seated and stretcher patient transport. Commercial flights are the first choice for stable patients needing to be flown long distances. For stretcher patients an airline-approved stretcher is necessary; note that this can limit the availability of commercial aircraft for rapid patient movement.

Medical evacuation by commercial aircraft is usually contraindicated in the following circumstances:

- contagious diseases
- agitation
- nauseating odours
- incontinence
- ongoing intensive medical care

In such cases, special authorisation by the airline and/or pilot is required.

Medical evacuation by scheduled commercial aircraft imposes additional requirements:

- The airline must consent to carry the patient by approving a medical clearance form.
- The medical clearance form is to be completed and submitted to the airline as soon as the need for medical evacuation by this means is determined (at least 48 hours of advance notice may be required).
- If necessary, oxygen should be requested from the airline (up to 180 litres of oxygen is required per person per hour).
- Suction equipment should be available.
- Conveniently placed hangers or hooks should be available to support the provision of intravenous fluids in flight.

Light fixed-wing aircraft and helicopters

In certain circumstances it may be necessary to use light fixed-wing aircraft or helicopters. Consideration should be given to:

- pressurisation of the aircraft
- stretcher accessibility
- pilot awareness concerning the extent of the injury or illness, and agreement to undertake the transport
- airline and/or pilot clearance of the equipment
- in-flight communication between the pilot and the patient escort

Air ambulances

Air ambulances may be used to transport patients who:

- are seriously ill/injured or have unstable conditions
- would not be accepted by a commercial flight
- have urgent conditions in locations where commercial flights are not available.

Aircraft standards

In certain types of aircraft (e.g., helicopters), consideration should be given to problems associated with:

- noise (hearing protection, communication between patient escort and patient);
- vibration
- temperature (in helicopters space blankets are highly recommended)
- air sickness
- psychological distress due to travel conditions
- use of certain medical equipment (e.g., defibrillator).

Medical evacuation by water transport

All watercraft which may be used for evacuation need to be able to accommodate a stretcher case in a safe, comfortable, and secure manner.

Watercraft standards for medical transport

Additional recommendations include the following:

- The craft must be ergonomically suitable for stretcher recovery work and should be equipped with an appropriate sheltering area or cabin to protect the patient lying on the stretcher as well as the medical escort and equipment.
- It must be equipped with appropriate life jackets for all on board including the patient, and be compliant with local water transport safety regulations.
- The position of the stretcher should allow the patient to be aligned along the long axis of the watercraft.
- Special precautions should be taken when using electrical equipment (e.g., automatic external defibrillator) in a wet environment to avoid electrocution of any personnel.
- The craft should have a power supply for powering medical equipment.
- It should carry a vacuum mattress for spinal cases and other cases needing immobilisation.
- These stretchers must be securely fixed to the watercraft.

Appendix 4: Guidelines for medical kits

Guidelines for medical kits

Tier 1 first-aid kit

- Contents list
- Cardiopulmonary resuscitation card
- Individually wrapped sterile adhesive dressings
- Sterile eye pads
- Surgical tape
- Triangular bandages
- Safety pins
- Medium and large sterile unmedicated dressings
- Alcohol-free cleaning wipes
- Surgical gloves
- Scissors
- Pocket mask
- Burns packet (e.g., Water-Jel™ or equivalent)
- Bag for clinical waste.

Access to an AED and eye wash facility is recommended.

Tier 2 medical kit

(in addition to Tier 1)

- Guidance leaflet
- Butterfly closures
- Crepe bandages
- Splints (inflatable or vacuum)
- Thermometer (digital)
- Forceps
- Pocket light
- Saline solution
- Burn blanket (space blanket)
- Tourniquet
- Suture set
- Sphygmomanometer
- Stethoscope
- Oro-pharyngeal airway
- Laryngeal mask
- Pulse oximeter
- Bag, mask and valve set (Ambu bag)
- Oxygen, tubing, manometer
- Foot operated suction unit with catheters
- Laryngoscope with blades, bulbs and batteries
- Endotracheal tubes
- Intravenous giving sets
- Intravenous cannulae
- Intravenous fluids
- Intramuscular injection needles and syringes
- Medication as approved by the supervising health professional (with manufacturer's prescribing information)
- Rehydration sachets
- Patient identity tags
- Injury and treatment summary charts and report forms
- Large torch with batteries
- Container for contaminated needles and sharps
- Thermometer
- Glucometer
- Splints
- Nasopharyngeal airways
- PPE
- Spinal immobilisation equipment
- AED +/– 12 lead capability
- Nebulizer capability
- Capnography device

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IPIECA

IPIECA is the global oil and gas industry association for environmental and social issues. It develops, shares and promotes good practices and knowledge to help the industry improve its environmental and social performance, and is the industry's principal channel of communication with the United Nations.

Through its member-led working groups and executive leadership, IPIECA brings together the collective expertise of oil and gas companies and associations. Its unique position within the industry enables its members to respond effectively to key environmental and social issues.

International Association of Oil & Gas Producers

IOGP represents the upstream oil and gas industry before international organizations including the International Maritime Organization, the United Nations Environment Programme (UNEP) Regional Seas Conventions and other groups under the UN umbrella. At the regional level, IOGP is the industry representative to the European Commission and Parliament and the OSPAR Commission for the North East Atlantic. Equally important is IOGP's role in promulgating best practices, particularly in the areas of health, safety, the environment and social responsibility.

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