Assessing fitness to dive; are there shades of grey within the blue?

A review of the fitness to dive assessment in working divers

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Introduction

In the world of occupational medicine, specifically in assessing fitness to work, there are increasingly less black and white cases. Complete contraindications seem a thing of the past and we can see on display the clashing or perhaps harmony of the Hippocratic principles of autonomy, beneficence and non-maleficence. When assessing fitness to dive, recognising the mental and physiological challenges undertaken within a safety critical environment, is there any room for shades of grey, for autonomy and for acceptance of risk? This poster will lay out the considerations involved in assessing fitness to dive, including those which might be up for debate when it comes to evidence based practice.



Scuba diver in Cabo Pulmo, Mexico

Approach to assessing fitness to dive

Assessing fitness to dive in workers in the UK should be approached using the HSE MA1 guidance forms undertaking history, examination and investigations to ascertain overall fitness.
One should consider health both systematically by body system and by conditions that interact with diving specifically.
This would include respiratory, cardiovascular, neurological, endocrine, ENT, musculoskeletal, gastrointestinal, genitourinary, dermatological and psychological systems.
It is also important in diving to assess aerobic fitness levels, BMI and psychological health along with personality/character traits.

Investigations

Investigations that might contribute to assessing fitness to dive include: BMI, waist circumference, exercise test (eg chester step test), visual acuity, spirometry, post-exercise PEF, blood pressure, audiometry, urinalysis. Chest radiography, resting ECG, full blood count and sickle cell test may be done if clinically indicated.

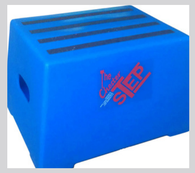


Image of the Chester Step utilised in the Chester Step Test.

Systematic disease considerations

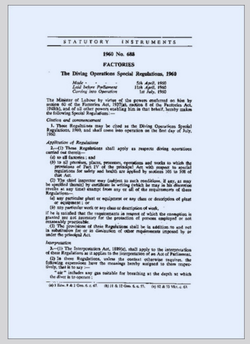
- Respiratory system: consider pressure change (eg pneumothorax history), and that which could cause acute SOB (eg acute infection, asthma).
- Cardiovascular system: consider that would restrict strenuous activity, cause incapacitation (eg dysrhythmia), or increase risk of immersion pulmonary oedema or DCI (eg PFO).
- Nervous system: consider symptoms predisposing to incapacitation, immobility or impaired vision.
- Musculoskeletal system: confirm mobility, dexterity and strength in line with the tasks the work requires.
- ENT system: identify risk factors to DCS and barotrauma
- Endocrine system: Confirm no predisposition to sudden incapacity, impaired thermoregulation or cardiac/muscular insufficiency.
- GI/GU: assess risk of hypovolaemia or renal dysfunction.
- Skin: assess susceptibility to infection or thermal dysregulation.
- Other factors to consider: obesity, infection, immunity, malignancy, medication, smoking, alcohol, disability and exercise tolerance.

Psychological/behavioural considerations

- Cognitive impairment - important to ascertain ability to communicate and perform safety critical duties
- Depression - ensure no predisposition to risk taking behaviour or suicidal ideation
- Anxiety - ensure ability to communicate and carry out emergency procedures
- Phobias - ensure none relevant to underwater environment/diving eg claustrophobia, marine life
- ADHD - ensure ability to concentrate on task and on safety measures
- Panic disorder - ensure ability to communicate and carry out methodical safety procedures in emergency settings
- Psychotropic medication - ensure no risk of incapacity, excess drowsiness etc
- Alcohol and drug misuse - ensure no risk of incapacity, excess drowsiness etc
- Behavioural - consider ability regarding teamwork, communication and working under stress.

Diving specific considerations

- Exercise tolerance - ensure physical fitness required for strenuous underwater work and diving itself
- BMI - measure of health/fitness as well as ensuring safe escape if working in confined spaces
- Disease impacted by pressure differences - particularly respiratory and ENT conditions.
- Predisposition to anxiety/panic attacks - ensuring ability to remain calm and communicate effectively and safely manage various high stress underwater scenarios
- Sudden incapacitation - ensure no risk to self or others through cardiovascular/neurological conditions causing sudden incapacity.
- Consider the specific diving role and what functionality is required for this.
- Specific contraindications include but are not limited to: under 18 years of age in offshore work, pregnancy, sickle cell disease, acute respiratory disease, acute seizure activity.



STATUTORY INSTRUMENTS

1960 No. 688

FACTORIES

The Diving Operations Special Regulations, 1960

The original UK diving at work regulations, The Diving Operations Special Regulations 1960'



The biopsychosocial model; therein lies the grey

The biopsychosocial model encourages us as physicians to assess and take into account all areas of a patient's wellbeing, including their biological, mental and social health within which there is significant interplay making up a person's overall health and fitness. There are some black and white conditions which should certainly prohibit diving such as recurrent uncontrolled epileptic seizures, but should some be up to the discretion of the physician and the choice of the patient such as level of physical fitness which is hard to measure? And should some conditions that exist in a field of grey be more black and white, for the greater good of the patient, such as a predisposition to anxiety and panic?

Should there be shades of grey in assessing particularly:
Physical fitness levels - is the chester step test highly accurate or specific or better suited to monitoring changes?
BMI - this is done in conjunction with waist circumference but is this an accurate measure of fitness?
Mental health - does the individual's autonomy and acceptance of risk trump non-maleficence? If someone has anxiety or panic disorder but wishes to accept the risk should they be allowed to?
Character traits - resilience, the ability to cope with stress, being calm under pressure - are these necessary or just desirable?
Pregnancy - given the lack of evidence due to ethics issues, should this be a blanket ban? What if the individual wishes to continue diving?

Conclusion

Given the safety critical nature of diving it is vital to thoroughly assess the fitness to dive of working divers prior to commencement of the role and annually thereafter to assess baseline and changes over time, with strict fitness to dive regulations being in place. A general and targeted history must be undertaken and crucially, functionality must be the key consideration. One must be familiar with the physiology, pathophysiology and psychology surrounding diving as a discipline and be astute in determining the overall risk the diving might pose, rather than simply employing a checklist methodology. It could be argued that there are some grey areas in the assessment, particularly around fitness which is currently a black and white standard and conversely that some grey areas such as psychological fitness which is a grey area, could indeed be more black and white for the sake of non-maleficence. There are a myriad of ethical principles at play and these could be applied across all areas of occupational medicine.

Diver Medic Logo of National Board Diving Hyperbaric Medical Technologies