

# Do Approved Doctors and Medical Referees in the UK agree when assessing a seafarer's fitness?

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## ABSTRACT

**Introduction.** The seafaring industry remains a hazardous occupation that requires sophisticated systems of risk and fitness assessment. This study aims to investigate the extent of agreement between Approved Doctors (ADs) and Medical Referees (MRs) when they assess a seafarer's fitness.

**Material and methods.** Between 2003 and 2009 a total of 232,878 seafarer medical examinations were carried out by ADs, of which 465 were considered by the MRs because the seafarer appealed against the AD's decision. The extent of agreement between ADs and MRs was studied.

**Results.** Two hundred and sixty-eight (58%) cases seen by the ADs were classed as category 4 "permanently unfit"; the referees only placed 85 (18%) of them in this category. On the other hand, 252 (54%) cases seen by the MRs were classed as category 2 "fit with restrictions", while the ADs had only placed 111 (24%) in this category. The overall agreement between the assessors (AD vs. MR) was poor (Kappa K = 0.18).

**Discussion.** For cardiovascular diseases and for mental ill-health, access to additional information by the MR was the commonest reason for changing the fitness category, but for all other conditions factors such as the experience and knowledge of the MRs or their different interpretation of the standards were the most frequent reasons for a change to fitness category or to restrictions.

**Conclusions.** This study found that there was poor agreement between the AD's decision and the subsequent MR's decision regarding the fitness of those seafarers who decided to appeal against the AD's initial assessment. The reasons for this are considered.

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**Key words:** seafarer, approved doctor, medical referee

## INTRODUCTION

Merchant seafaring has long been regarded as one of the most hazardous occupations in Britain [1]. The Royal Commission on Loss of Life at Sea reported between 1885 and 1887 that the fatal accident rate in UK merchant shipping was about six times greater than that in coal mining, ten times high-

er than for railway workers, and approximately 150 times that for factories and shop operatives [2]. Recently, it was reported that seafaring was the second most hazardous occupation after commercial fishing in Great Britain and was more hazardous than construction, manufacturing, and other industrial sectors [3].

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It is a legal requirement of the Merchant Shipping (Medical Examination) Regulations 2002 that anyone employed or engaged on a seagoing ship must have a medical certificate attesting to their fitness for the work for which they are employed. Seafarer medical examinations are conducted by Approved Doctors (ADs), who are formally appointed by the Secretary of State, but with responsibility for appointment delegated to staff of the Maritime and Coastguard Agency (MCA) [4]. These regulations place a duty on seafarers working on board UK ships to take care of their health and safety and to co-operate with their employers. The mandatory seafarers fitness standards are specified by the Secretary of State under the Merchant Shipping (Medical Examination) Regulations 2002 (The 2002 Regulations) and (from 6 April 2010) the Merchant Shipping (Maritime Labour Convention) (Medical Certification) Regulations 2010 (The 2010 Regulations). The 2010 Regulations reflect the changes required to comply with the Maritime Labour Convention in relation to medical fitness certificates [5].

The purpose of the seafarer medical assessment is to ensure that the individual seafarer is fit for the work for which he or she is to be employed, taking into account the particular risk associated with working at sea.

Based on the medical assessment, the AD will issue a certificate in one of the following fitness categories:

- **category 1:** fit for sea service, with no restrictions;
- **category 2:** fit for sea service but with restrictions;
- **category 3:** temporarily unfit for sea service;
- **category 4:** permanently unfit for sea service.

Restrictions may include: the types of duties that can be undertaken, operational area, and type of vessel. The fitness certificate may also be issued for a period less than the normal duration of two years [6].

Seafarers have a right to seek a review by an independent referee, who is appointed by the MCA on behalf of the Secretary of State, if they are not satisfied with the decision of an AD. Seafarers who request a review must apply within one month of the date on which the seafarer is given notice by the AD of refusal, restriction, or suspension of a certificate. In addition, where the MCA recognises that specific existing medical standards are not in line with developments in medical treatment, ADs are encouraged to indicate to seafarers that they should consider asking for a review by a medical referee (MR) [7, 8].

The MR will see the seafarer and assess their medical history and clinical findings to determine whether the AD made an appropriate decision on their fitness category. They may review or request clinical reports or investigations and will, if they do not endorse the AD decision, issue a revised certificate of fitness.

The MCA standards are based as far as possible on evidence of risk, but the evidence base in maritime health is limited [9, 10]. The 2002 standards applied throughout the period studied but have since been replaced in early 2010 [5].

This study aims to investigate the extent of agreement between Approved Doctors and Medical Referees when they assess a seafarer's fitness.

## MATERIAL AND METHODS

The following categories of data were extracted from the seafarer medical review- Medical Referee's report (MSF 4108) forms, which form the basis for six monthly peer case review meetings of referees: age, gender, referee code, medical category, type of work, AD's decision category, MR's decision category, result of appeal, and MRs case review committee meeting endorsement of decision.

Each MR was assigned a unique non-transferrable code (1–12) to ensure confidentiality. MRs are located across the UK, and they have knowledge of maritime health. The medical conditions of those seeking review were coded using the 16 categories on the (MSF 4108) forms. Cancers, blood disorders, digestive, genito-urinary, infections, skin, general, and pregnancy categories were placed in a single category "miscellaneous" for the analysis. Type of work has been categorised as deck, engine, catering, and others. Others included: scientist, technician, entertainer, franchise operator, casino staff, and medical staff.

The AD's decision was categorised into one of the four fitness categories described in the medical assessment above. The result of a review was considered in terms of the difference between the AD's decision and that of the MR, which was classified as:

1. No change (same category, but could alter the imposed restrictions);
2. Upgrade (MR's decision gave the seafarer more flexibility to work at sea);
3. Downgrade (MR's decision was stricter than the AD's decision, further limiting the seafarer's work at sea).

Data were entered using Excel software (Microsoft Office 2007®) and analysed using SPSS for Windows (Statistical Package for the Social Sciences, version

16.0). For non-parametric group comparison of categorical data (ordinal and nominal values), the chi-square  $\chi^2$  was used. All indicated  $p$  values were two-sided, and  $p < 0.05$  was regarded as statistically significant. Ninety-five per cent confidence intervals (95% CIs) were used.

Analysis of the (MSF 4108) forms was undertaken to identify the reasons why the MRs changed the fitness grading or the restrictions of the appellant seafarer's fitness. In some cases the appellant provided additional information to the MR, in other cases a new event had occurred between the AD and the MR assessments, and sometimes the MR had requested and received a report from the appellant's General Practitioner or specialist. However, in some cases the MR interpreted the standards differently from the AD, and the most likely explanation was that the MR used a greater level of experience and knowledge of seafaring to interpret and apply the standards. The reasons for changing the grade or the restriction were therefore coded into four categories:

1. More information;
2. New event;
3. GP/specialist report;
4. Other (which includes experience, knowledge, and different interpretation of the standards by the MRs).

Genito-urinary, digestive, blood, and cancer (36) cases were excluded from analysis as each of these medical categories had less than 20 cases. Chi-square  $\chi^2$  analysis could not be validly applied to such small numbers.

For inter-rater reliability the kappa statistic  $K$  was used to assess the extent of agreement between the AD and the MR. The kappa statistic is a measure of agreement between raters (assessors) classifying subjects into two nominal or ordinal categories. It is also improvement over simple percentage agreement since it discounts the proportion of agreement by chance alone. Values for  $K$  will usually fall between zero and 1, zero indicating only chance agreement and 1 indicating perfect agreement. Suggested interpretation of agreement for different values of  $K$  are:  $\leq 0.20$ , poor; 0.21–0.40, fair; 0.41–0.60, moderate; 0.61–0.80, good; and 0.81–1.00, very good agreement [11]. Because the opportunities for error and disagreement increase as the numbers of categories increase, a weighted  $K$  statistic ( $K_w$ ) has been used to adjust for the extent (seriousness of different level) of disagreement.

The Cambridge Research Ethics Committee confirmed that the study did not require ethical approv-

al due to its nature (retrospective), the anonymised data (no names, date of birth, or addresses to identify the seafarer), and the statutory nature of the medical examination.

## RESULTS

From May 2003 to May 2009, 232,878 seafarer medical examinations were carried out by ADs; 465 of these seafarers were assessed by MRs because they had appealed against the AD's decision. Of the 465 cases, 444 (96%) were male and 21 (4%) were female. The mean age was  $43.8 \pm 14.4$  years (mean  $\pm$  SD; range = 16–74 years) for all and was  $27.3 \pm 9.2$  years for females. The median age was 53 years. One hundred and fifty-six (34%) were aged between 50–59 years, and 28 (6%) seafarers were under the age of 20.

Cardiovascular diseases were the most frequent cases considered for appeal amounting to 143 (31%). Sensory deficits comprised 44 (73.3%) vision, 14 (23.3%) hearing, and 2 (3.3%) combined vision and hearing (Table 1).

There were 233 (50%) seafarers who worked in the deck area, 106 (23%) in the engine area, 39 (8%) in catering, and 87 (18.7%) in the 'others' category.

Two hundred and sixty-eight (58%) cases seen by the ADs were classed as category 4 "permanently unfit"; the MRs only placed 85 (18%) of them in this category. On the other hand, 252 (54%) cases seen by the MRs were classed as category 2 "fit with restrictions", while the ADs had only placed 111 (24%) in this category (Table 2).

MRs upgraded the seafarer's fitness category (which means more flexibility to work at sea) in 271 (58%) cases with various levels of upgrading. While the seafarer's fitness category was unchanged in 184 (40%) cases, the MRs may have changed the restrictions or the period of fitness on the fitness certificate especially with fitness category 2. There were 10 (2%) downgraded cases (Table 3).

The "other" category was the commonest reason for grading or restrictions change, amounting to 185 cases (43%) followed by "more information" in 149 cases (34.7%). However, "more information" was the most frequent category when considering cardiovascular and mental ill-health cases (Table 4).

The categorisation of kappa  $K$ -weighted values has been discussed in the methods section. The measured kappa  $K$  is equal to 0.18, which indicates that the agreement between the assessors (AD vs. MR) was poor. The weighted value of kappa  $K_w$ , which

Table 1. Medical categories; mean age, range, and standard deviation

Medical category	n (%)	Mean age (years)	Range (min-max) (years)	Standard deviation (SD)
Cardiovascular	143 (31)	53.1	20-74	7.7
Endocrine	66 (14)	40.0	18-60	12.1
Sensory	60 (13)	35.3	16-70	15.6
Neurological	44 (10)	41.7	20-61	12.9
Respiratory	42 (9)	29.5	16-65	13.5
Mental	38 (8)	37.8	17-60	12.7
Musculoskeletal	36 (8)	51.9	17-66	14.0
Genitourinary	13 (3)	45.9	25-63	12.2
Digestive	9 (2)	40.8	28-59	10.7
Blood	8 (2)	46.0	21-61	15.4
Cancer	6 (1)	53.7	34-61	11.7
<b>Total</b>	<b>465 (100)</b>	<b>43.8</b>	<b>16-74</b>	<b>14.4</b>

Table 2. AD's decision and MR's decision

AD's decision	n (%)	MR's decision	n (%)
Fit	0 (0.0)	Fit	66 (14.2)
Fit with restrictions	111 (23.9)	Fit with restrictions	252 (54.2)
Temporarily unfit	86 (18.5)	Temporarily unfit	62 (13.3)
Permanently unfit	268 (57.6)	Permanently unfit	85 (18.3)
<b>Total</b>	<b>465 (100)</b>	<b>Total</b>	<b>465 (100)</b>

Table 3. Result of appeal in relation to medical category

Medical category	Result of appeal n (%)			Total
	Downgraded	No change	Upgraded	
Cardiovascular	3 (2.1)	62 (43.4)	78 (54.5)	143
Endocrine	2 (3.0)	25 (37.9)	39 (59.1)	66
Sensory	0 (0.0)	23 (38.3)	37 (61.7)	60
Neurological	1 (2.3)	24 (54.5)	19 (43.2)	44
Respiratory	1 (2.4)	16 (38.1)	25 (59.5)	42
Mental	2 (5.3)	17 (44.7)	19 (50.0)	38
Musculoskeletal	0 (0.0)	9 (25.0)	27 (75.0)	36
Genitourinary	1 (7.7)	2 (15.4)	10 (76.9)	13
Digestive	0 (0.0)	3 (33.3)	6 (66.7)	9
Blood	0 (0.0)	2 (25.0)	6 (75.0)	8
Cancer	0 (0.0)	1 (16.7)	5 (83.3)	6
<b>Total</b>	<b>10 (2.2)</b>	<b>184 (39.6)</b>	<b>271 (58.3)</b>	<b>465</b>

Table 4. Reasons for grading or restrictions change in 429 appeal cases\*

Medical category	Reasons for grading/restrictions change n (%)				Total
	More information	New event	GP/specialist report	Other	
Cardiovascular	65 (45.4)	18 (12.6)	27 (18.9)	33 (23.1)	143
Endocrine	20 (30.3)	8 (12.1)	5 (7.6)	33 (50.0)	66
Sensory	10 (16.7)	10 (16.7)	3 (5.0)	37 (61.6)	60
Neurological	15 (34.1)	1 (2.2)	5 (11.4)	23(52.3)	44
Respiratory	10 (23.8)	1 (2.4)	3 (7.1)	28 (66.7)	42
Mental	17 (44.7)	0 (0.0)	7 (18.5)	14 (36.8)	38
Musculoskeletal	12 (33.4)	4 (11.1)	3 (8.3)	17 (47.2)	36
<b>Total</b>	<b>149 (34.7)</b>	<b>42 (9.8)</b>	<b>53 (12.4)</b>	<b>185 (43.1)</b>	<b>429</b>

\*Genito-urinary, digestive, blood, and cancer (36) cases were excluded from analysis. See methods section

Table 5. AD's decision versus MR's decision

AD's decision n	MR's decision n				Total
	Fit	Fit with restrictions	Temporarily unfit	Permanently unfit	
Fit	0	0	0	0	0
Fit with restrictions	25	81	3	2	111
Temporarily unfit	12	44	25	5	86
Permanently unfit	29	127	34	78	268
<b>Total</b>	<b>66</b>	<b>252</b>	<b>62</b>	<b>85</b>	<b>465</b>

measures levels of disagreement as well as agreement, is 0.20 and is thus classed as poor. This indicates that there was a high level of disagreement between the medical assessors (AD vs. MR) (Table 5).

## DISCUSSION

This study identified poor agreement between the MR's decisions and the AD's decisions among seafarers who decided to appeal against the AD's initial decision. A parallel study that assessed the determinants of agreement between the MRs themselves found that MRs consistently upgraded the fitness category of seafarers and preferred to use the "fit with restrictions" category to allow more seafarers to remain in employment [12].

The MCA approves 250 ADs in the UK and overseas to carry out medical assessments. They are supported by MCA medical and administrative staff [13].

The number of appeal cases ranged between 1.80 and 2.24 per 1000 medical examinations conducted by ADs. There was no specific trend of the appeal cases referred to MRs over the years and it fluctuated from one year to another, with the highest in 2003 and the lowest in 2007.

More than half of the musculoskeletal (75%), respiratory (60%), endocrine (59%), and cardiovascular (55%) cases were upgraded by MRs, which suggests that the medical standards used by the ADs were either stricter than required, or were applied more strictly by them than by the MRs. Advanced technology in joint replacements, research on asthma, and angioplasty with stenting have made a considerable difference to the outcome when treating these conditions [14–16]. It is also possible that those seafarers who had AD decisions on their fitness that were just below the boundaries for each fitness category were more likely to seek a review.

Analysis of the MSF 4108 forms identified four main reasons why the MRs changed the grading or the restrictions of the appellant seafarer's fitness category:

1. More information was available to the MR from the appellant at the time of consultation; categorised "more information".
2. A new event (treatment, investigation, surgery, or special test) had been conducted between the AD's assessment and the MR's assessment; categorised "new event".

3. The MR wrote to the appellant's General Practitioner (GP) or specialist for more information, and sometimes commissioned a specialist report funded by the MCA; categorised "GP/specialist report".
4. The MR interpreted the standards differently to the AD due to greater experience of seafaring and/or greater knowledge and experience of the application of the standards; categorised "other".

"Other" was the most frequent category for a grading or restrictions change in all medical categories apart from cardiovascular and mental ill-health cases where "more information" was the most frequent reason for changing fitness decisions.

The experience of the MRs ranged from previous work in the Driver and Vehicle Licensing Agency (DVLA), the Royal Navy, offshore medicals, fire and rescue, the police force, Health and Safety Executive, emergency medicine, and radio medical advice to ships. Some of the MRs worked or are still working in more than one of these fields [12]. The decision-making processes in driving and seafaring were similar in their need for more specific information to reach decisions and also in the use of risk stratification of disease recurrence rates as the basis for decisions [17]. The DVLA used a 2% per annum risk of recurrence as a benchmark; this same level is used where practicable for seafarers [6].

If the appellant seafarer wishes to submit additional medical evidence in support of his/her appeal application, he/she has to arrange for this to be sent to the MR concerned before the appointment date. It is worth mentioning that the appellant seafarer has the freedom to choose which MR will review his/her case. However, generally the seafarer tends to choose the MR who is closest.

The outcomes of the appeal process were measured by the difference between the AD's decision and the MR's decision. Fifty-eight per cent of the appellant seafarers benefited from the process and were granted an upgrade in their fitness category. Forty per cent of the appellant seafarers who had no change in their fitness category frequently benefited from less or different restrictions that allowed them to continue in employment and to work at sea in some capacity. Only the 2% of the appellant seafarers who had been downgraded were disadvantaged by the process.

The MCA appeal system appears to be working for the benefit of seafarers who decide to appeal against the initial AD's decision. Alternatively, seafarers seeking a review by a MR may be more likely to contest an AD's decision when it is just below the

boundary between fitness categories and thus be more likely to have it re-assessed in their favour.

The strengths of this study include the large population base: 232,878 seafarers' medical examinations over 6 years with 465 referee reviews.

The limitations include the lack of studies for comparison, the difficulty of analysing all the variables affecting the MR when he/she takes the decision about fitness, which could be influenced by the MR's experience, seafarer's specific job circumstances, and other unidentified factors. It has not been possible to compare the outcome of the refereeing process with the decisions taken in those seafarers who decided not to appeal against their AD's decision in this investigation.

In 2008 the MCA decided to review the 2002 fitness standards in light of changes in medical diagnosis, treatment, disability legislation, and the decision-taking processes, especially as they became apparent during the peer review assessment with MRs. As a result more seafarers are now allowed to work at sea with restrictions and reasonable adjustments under the new 2010 fitness standards.

The 2010 fitness standards aim to help the ADs in reaching better clinical decisions, allowing more seafarers to continue working at sea, and reducing the number of appeal cases [5]. More work is needed to assess the efficacy of the 2010 standards in resolving the shortcomings in the 2002 standards, which have been the basis for this study.

## CONCLUSIONS

This study found that there was poor agreement between the MR's decision and the AD's decision regarding the fitness of those seafarers who decided to appeal against the AD's initial assessment.

The MCA appeal system appears to be working for the benefit of the seafarers who decided to appeal; this could be due to the MR's experience, knowledge, and interpretation of the standards. Therefore, seafaring fitness standards need more clarity and flexibility in relation to the decisions being made by the ADs. To reduce this bias, seafaring fitness standards need to give greater discretion to the ADs and provide them with information and training to assist them in applying them appropriately.

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## CONFLICTS OF INTEREST

None declared.

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