



The identification of combat survivability tasks associated with naval vessel damage in maritime environments



Kane J. Middleton^{a, c, *}, Amelia J. Carr^{b, d}

^a Centre for Human and Applied Physiology, School of Medicine, University of Wollongong, Wollongong, Australia

^b Land Division, Defence Science and Technology Group, Melbourne, Australia

^c La Trobe Sport and Exercise Medicine Research Centre, School of Allied Health, La Trobe University, Melbourne, Australia

^d School of Exercise and Nutrition Sciences, Faculty of Health, Deakin University, Melbourne, Australia

ARTICLE INFO

Article history:

Received 14 September 2015

Received in revised form

29 July 2016

Accepted 26 August 2016

Keywords:

Employment standards

Task analysis

Physically demanding occupation

ABSTRACT

Effective Navy personnel have the physical ability to perform combat survivability tasks commensurate with their unique physical requirements due to the distinctive characteristics of naval platforms. The aim of this investigation was to identify the physically demanding whole-of-ship tasks that are performed by Navy personnel while at sea. A mixed method design was used to identify tasks, inclusive of focus groups and field observations. From a series of ten focus groups, nine tasks were deemed to be physically demanding whole-of-ship tasks. A subsequent field observation of a combat survivability training course resulted in a refined and expanded 33-item list of physically demanding whole-of-ship tasks across six categories, including; replenishment at sea, emergency response, firefighting, leak stop and repair, toxic hazard and casualty evacuation. The findings from this study provide the basis for the development of physical employment standards for whole-of-ship tasks within the Royal Australian Navy.

Crown Copyright © 2016 Published by Elsevier Ltd. All rights reserved.

1. Introduction

Active combat has illustrated the devastating effect weaponry such as anti-ship missiles, torpedoes and mines can have on naval vessels. To survive such attacks, it is necessary for the conduct of physically demanding and time critical firefighting, leak stopping and structural repair in order to maintain operability (Famme and Taylor, 1992; Brown et al., 2000). Even during peacetime, knowledge of- and proficiency in-damage control cannot be relaxed due to the ever present potential for fire, collision and/or grounding of maritime vessels (Zhu et al., 2002). The main aims for employing combat survivability measures include limiting the extent of damage and protecting personnel from the effects of vessel damage. These aims cannot be met if proficiencies in combat survivability are not maintained through regular training and exercise. The skill sets involved in combat survivability are perishable and any decline can be catastrophic, involving the potential for loss of

resources and/or life (Report of the board of enquiry, 2003).

The physical demands of specific whole-of-ship tasks performed by Navy personnel have previously been investigated (Bilzon et al., 2001; Bilzon et al., 2002). These studies were conducted on a single Frigate of the Royal Navy and identified that many common tasks, especially those relating to combat survivability, are whole-of-ship tasks performed by the entire ship's company. In fact, many Navy personnel spend a greater proportion of their work time performing these whole-of-ship tasks than category-specific tasks (Dowrick et al., 2007). For example, shipboard firefighting is a physically demanding task that all personnel are required to perform if required, with an aerobic demand of up to $43 \pm 6 \text{ ml min}^{-1} \cdot \text{kg}^{-1}$ for a manual handling task (Bilzon et al., 2001), which is similar to the $43 \text{ ml min}^{-1} \cdot \text{kg}^{-1}$ reported during civilian firefighting (Gledhill and Jamnik, 1992). Manual handling tasks during firefighting seem to be common among firefighting services with the majority of fireground work involving dragging and carrying (Phillips et al., 2012).

It is possible that combat survivability related whole-of-ship tasks are common across platforms, and the analysis conducted by Bilzon and colleagues (2001, 2002) may not necessarily cover the physical demands of the same tasks conducted on other platforms. When investigating common intra- and inter-platform tasks, a

* Corresponding author. La Trobe Sport and Exercise Medicine Research Centre, School of Allied Health, La Trobe University, Plenty Road & Kingsbury Drive, Melbourne VIC 3086, Australia

E-mail addresses: k.middleton@latrobe.edu.au (K.J. Middleton), amelia.carr@deakin.edu.au (A.J. Carr).

number of factors must be taken into account. Each ship class has its own set of unique characteristics. For example, the platforms of the Royal Australian Navy (RAN) range in size from about 35 m to 190 m in length, have two-to-six main working decks and vary in crew size from about 15 personnel to 200 personnel (Royal Australian Navy, 2015). These characteristics may dictate the physical and physiological demands of certain tasks, even those that are common across platforms. It is essential in the development of physical employment standards in maritime environments that job task analyses (Sharkey and Davis, 2008) are conducted to identify common inter- and intra-platform tasks and the characteristics of such platforms are taken into consideration. This will ensure that tests are developed that ensure personnel have the appropriate physical capacity to safely and effectively carry out those tasks (Larsen and Aisbett, 2012).

Therefore the aim of the current study was to identify the common intra- and inter-platform whole-of-ship tasks of the RAN. It was expected that common intra- and inter-platform whole-of-ship tasks would be identified and the potential of a 'baseline' physical employment standard for naval forces would be viable.

2. Methods

2.1. Experimental design

All participants gave written informed consent to all procedures approved by the Australian Defence Human Research Ethics Committee throughout all phases of this study. The experimental design of the current study followed a mixed-methodology stepwise approach and was adapted from previous models of trade and task analyses (Taylor and Groeller, 2003; Payne and Harvey, 2010), including the identification, review, confirmation and initial observation of job tasks (Fig. 1). The design incorporated a decision tree throughout the process to aid in systematic task reduction.

2.2. Sea-riding experience

To gain an initial understanding of general sea tasks and the day-to-day duties of a ship's company at sea, members of the research team were attached to a Guided Missile Frigate of the RAN for a period of five days. The Adelaide Class Guided Missile Frigate is a major warship within the RAN providing, roles such as long range escort and surface and undersea warfare. The Adelaide Class

Guided Missile Frigate has a displacement of 4267 tonnes, a 13.7 m beam and a 4.5 m draught and is 138.1 m in length with six main working decks. The total complement of crew on a RAN Adelaide Class Guided Missile Frigate is 184 persons. The five days aboard the vessel coincided with the ship's work-up period, which is the period of time when training is provided to reach the required level of ship-level technical capability necessary for an operation. The RAN advised the researchers that this period would allow for the greatest concentration of tasks being performed.

2.3. Policy and research document review

After the sea-riding field observation, a review of damage control policy (Royal Australian Navy, 2015) and a 168-item RAN whole-of-ship occupational analysis (Dowrick et al., 2007) was conducted. This review was undertaken in order to construct an initial inventory of physically demanding whole-of-ship activities to be presented in subsequent focus groups (Table 1). The tasks included in the whole-of-ship task inventory were selected independently by two members of the research team. In order to limit the number initial tasks presented to participants in the focus groups and the directive to investigate whole-of-ship tasks, only those that were performed by more than 20% of the population sampled by Dowrick et al. (2007) and were subjectively deemed to require at least light-moderate physical effort were considered. Any unknown nomenclature was translated by a senior RAN Officer prior to presenting the task inventory to RAN personnel during focus groups in order to perform a detailed review of identified whole-of-ship activities.

2.4. Focus groups

2.4.1. Study location and description

A total of ten workshops were held over a two-month period (April–May 2013). Workshops were conducted at Fleet Base East (Sydney, New South Wales), Fleet Base West (Perth, Western Australia), HMAS Waterhen (Sydney, New South Wales) and HMAS Cairns (Cairns, Queensland). Subject matter experts subjectively quantified the task parameters and criteria of typical operations. Consequently, consideration was given to the overall operational roles, responsibilities and missions that may impact upon these tasks.

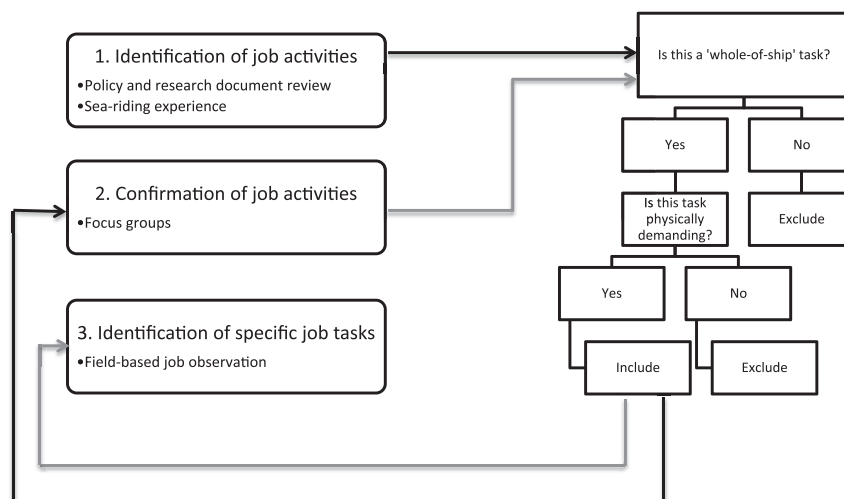


Fig. 1. Overview of the stepwise process to identify job tasks in the development of physical employment standards and assessments for the Royal Australian Navy.

Download English Version:

<https://daneshyari.com/en/article/4972153>

Download Persian Version:

<https://daneshyari.com/article/4972153>

[Daneshyari.com](https://daneshyari.com)