

MUSCULOSKELETAL DISCOMFORT RISK FACTORS FOR MEDICAL RADIATION TECHNOLOGISTS PERFORMING BREAST SCREENING

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ABSTRACT

Medical Radiation Technologists (MRTs) performing routine mammography for a DHB were commonly reporting musculoskeletal discomfort (MSD). MRTs worked under BreastScreen Aotearoa (BSA) contracts, completing mammograms for women 45-69 years. The DHB's Occupational Health and Safety Service sought ergonomist input to identify the systems issues impacting on the musculoskeletal health of MRTs. Assessment identified that MRT's were primarily mature women (50+ years) reflecting the national MRT workforce demography. The population covered by the DHB service was of varied ethnicity, and BSA had drives to reach more Pacific Island and Maori women. A high percentage of this target group have larger body size and take longer to screen due to the increased number of breast tissue images required. Additionally these women may not understand the verbal instructions due to language difficulties. Other contributing factors for MSD were that MRTs worked to achieve BSA screening targets; new bookings were made without knowledge of those possibly requiring double appointments, and the booking system had little buffer time causing the MRTs to work into break times. No education was given to women about how to carry out the movements and actions required for the mammogram - they therefore remained passive and the MRT positioned the body and breast tissue. MRTs held a range of awkward and repeated postures of the legs, back, neck, shoulders, arms, wrists and hands in order to obtain clinically excellent mammograms, for up to 25 women per day. MRT training processes did not cover positioning methods that are safe for working with larger women. Multiple interventions were identified to reduce the range of musculoskeletal risk factors faced by MRTs.

INTRODUCTION

The Breast Screening Service of a DHB found that 3 of its 4 MRTs were experiencing MSD, and sought ergonomist assistance to identify and address MSD contributory factors present at all levels of the work system. The project brief was 'to identify the risk factors for MSDs within the Breast Screening Service (including physical design, education/training, and work organisation factors)', and 'the development of prioritised recommendations for addressing the identified MSD risk factors'.

METHOD

Optimise ergonomists used a standard consulting approach for this work, and worked within the constraints of the agreed project brief. A range of archival data was gathered regarding the Breast Screening Service and the national screening program, BSA. Individual semi-structured interviews were completed with MRTs and service managers, but the scope of this project prevented interviews with women attending for mammograms. Observations of the work tasks and actions of MRTs both in the clinic and on a mobile unit were carried out following the MRT seeking approval for the ergonomist to be present. No photos or videos were taken with women having mammograms, but MRTs simulated the breast screening process with Optimise ergonomists in order for photographs and video material to be obtained, and to allow discussion and explanation of the task components.

As this project was a work systems assessment, the luxury of a focus in any one area of human/systems function was not afforded. Adequate data covering many aspects of system function was gathered and analysed, and the findings used to identify the range of factors contributing to MSD. This led to the development of the recommendations which were passed to the client to action.

FINDINGS AND DISCUSSION

Population Base

The DHB operates in an area with a high population of Maori and Pacific Island peoples and many other non-English speaking cultures. For the process of performing mammograms interpreters are often required, and a wide variety of religious and cultural practises can make the sensitive issue of breast screening even more complex. Cultural training for MRT staff has become important. BSA has drives to reach more women from Maori and Pacific Island population groups. Many women from these groups have large body size, and consequently they have large breasts – thus more breast tissue that must be screened.

MRT Workforce

NZ's MRT workforce is mature with 66% over 40 years of age (MRT 2006 Annual Workforce Survey). MRTs are in demand in NZ, with recruitment a nationwide problem. "Difficult" client bases such as that described above appear to exacerbate the difficulty in some areas. The 2006 Workforce Survey reported that there were 118 MRTs working in NZ, filling 60.4 FTE. The attrition rate for 2006 was 23%, with 'injury' and 'screening pressure' contributing to the reasons for MRTs leaving the profession. Two additional

MRT positions had been advertised by the DHB in this study, but without strong response.

Literature Review

An in-depth literature review was not completed for this study, but some knowledge of recent Australian efforts (Robertson et al, 2008) to address the issue of MSD for MRTs was known of (where intervention efforts were focussed on the MRTs work methods/physical positioning), and the lead MRT provided a copy of some recent work carried out in the UK; 'Ergonomic Assessment of Mammography Units' (Gale et al, 2007). This report from the NHS detailed design factors regarding the usability of mammography units, and recognised the biomechanical demands of frequent actions. Few practical work system interventions were suggested, though the changes that may come from the imminent introduction of digital technology were discussed.

Archival Data

A wide range of BSA, DHB, and Breast Screening Service documentation was reviewed. This included job induction information, hazard identification, audits, job descriptions, intranet information about the service, BSA website information, service analysis records, brochures and information available at the clinic, client survey reports, incident reports, and previous health and safety reports for the area. A key finding was that the hazard identification for the area was weak in identifying MSD contributory factors/risks (and therefore controls).

National Breast Screening Programme

BSA offers free breast screening to asymptomatic women aged 45-69 years in the hope of reducing breast cancers by early detection and treatment. They aim to screen women two yearly. Target screening volumes are set, but in the case of staffing shortages may be relaxed. Funding is on a fixed 'per woman screened' basis. Double screening times are given when it is known that the woman requires an interpreter, has a disability or uses a wheelchair, or has cognitive limitations. Larger women whom may need more images (usually 4 images per woman, but up to 12) take longer, and this puts pressure on the MRT to complete her appointments in the required time. Information that might lead to this factor being catered to is not gathered prior to setting the first



Figure 1. Mammography unit.

appointment, but is usually known at consequent appointments.

MRTs two areas of responsibility are: the provision of an acceptable screening process for women, and the provision of high quality images to ensure the detection of small cancers. MRTs work as part of a broader medical team, contributing to the process of taking breast lump biopsies and other breast procedures in addition to the breast screening work.

Task Analysis

The mammography unit is free standing. The woman stands (or sits) up to it, and must move body and arms into various positions in order for their breast to be moved into the correct position on the 'bucky', for high quality breast images to be taken. The top of the machine is swung into different positions to facilitate gaining the correct angle for breast images. Once the breast is in the correct position, the pressure plate is lowered and the image taken. Plates are changed for each image, and the x-ray films developed.

Around 10-20 minutes is taken for each woman, with appointments every 15 minutes from 8.30 until 4.30, with 15 minute tea and 60 minute lunch breaks. Around 25 women are screened per day. Some late night and Saturday morning screenings are offered.

Whilst a number of brochures are available on the BSA programs, no information was available giving the women attending information on the actions that would be required of them for screening. These actions are somewhat awkward (feeling a lot like you are tying yourself in a knot around a hard-edged piece of machinery). There are no pictures or other diagrammatic clues as to where you must move, or how to hold your body. MRTs instruct in the actions required, but may leave little time for the woman to carry out the action. This leaves no choice but for the MRT to physically assist body positioning and carry out breast tissue positioning. These actions usually require moving or assisting the movement of arms, shoulders, breasts and the upper body.

Observation of their work methods and analysis using REBA showed a range of awkward stooping, squatting, and bending actions, and many arm and



Figure 2. MRT positioning the arm and body for breast screening.



Figure 3. Simulation of MRT positioning a breast.

shoulder reaching actions. MRTs use their hands firmly but gently to position breast tissue – grasping, pulling, lifting, smoothing – often with their shoulders elevated and abducted. Some of these actions are forced by the nature of the task but others are learned methods that can be altered. The work methods taught in training appeared to require updating to include safe methods for working with tall and large women particularly.

Observation and recording of the MRTs movements around the department identified room for design/layout improvements. A computer workstation used for data entry was poorly setup, and the light-boxes used to check images were in a high position, both contributing to MRTs discomfort experiences. Additionally, the future move to digital will remove film development tasks, thus increasing the MRTs potential exposure to high risk manual handling actions.

Discomfort Reporting

Discomfort reports were gathered via a modified Nordic Musculoskeletal Questionnaire as part of interviews. Results showed high prevalence of neck, elbow, wrist/hands, and lower back problems among MRTs.

RECOMMENDATIONS

The findings were analysed and integrated to identify a range of MSD risk-reducing interventions.

Physical Design Recommendations

- improving the layout of the clinic and mobile unit for less travel between key workstations
- improving the computer workstation (desk, computer equipment, seating)
- trial of a saddle seat for positioning the woman attending for screening
- lowering the film viewing box
- shelf/trolley provision to reduce handling and carrying of cassettes
- design changes appropriate to new technology and relocation plans

Work Organisation Recommendations

- communication with BSA regarding the issues identified, and the need to work collaboratively on MSD risk reduction for MRTs
- actions to identify whether 'large' women may need double appointments from the first appointment
- collaborative work to develop alternative safe movement methods for MRTs working with large women (likely to include seating options,

methods to better gain active participation, and identifying MRT movements that are least risky)

- development of brochures, videos, volunteer support etc to facilitate women's active and assistive participation in the screening method, to decrease the physical load on MRTs
- that discomfort reporting be included in the workforce survey
- improved manual handling hazard identification and controls documentation
- improved rest break scheduling
- reviewing the mobile unit schedule to alternate 'hard' and 'easier' geographical areas
- evaluation of the effectiveness of any new strategies
- planning for the future move to digital imaging processes
- modification of the MRT Workforce Survey to include a discomfort survey and more age bands.

Education and Training Recommendations

- coverage for all MRTs on current understanding of MSD causation and the range of prevention methods
- identifying and training of MRTs in safe movements/postures for screening tasks (preferably commencing in their education system)
- training in safe computer workstation use
- ongoing cultural awareness training.

References

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