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**ERGONOMICS AND USER INCLUSIVITY:
DEVELOPING DESIGN CRITERIA AND SPECIFICATIONS
FOR A MEDICAL EXAMINATION COUCH**

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A thesis submitted for the degree of Masters of Industrial Design at
the University of Canberra

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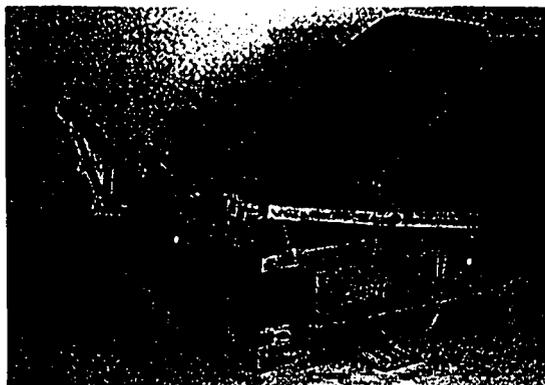
ABSTRACT

A medical examination couch is a primary piece of equipment in the health care delivery system. Unfortunately, the current design of examination couches used by Australian general and nursing practitioners is inadequate. Incompatibility of the couches with physical (anthropometric) dimensions and a majority of medical procedures contribute to risks of Cumulative Trauma Disorders (CTDs) or musculoskeletal problems among practitioner-users. The inappropriate height, width and gynaecological attachments of the existing couches also cause patient discomfort.

This research aimed to develop a new examination couch design in order to improve practitioners' effectiveness, efficiency, health and safety while enhancing patient comfort. Ergonomics and user inclusivity were implemented in the vital stages of the couch development process. Practitioner and patient surveys, reviews of patient positions, medical procedures and equipment, Hierarchical Task Analysis (HTA) and an ergonomic analysis of couches in the Australian market were conducted to develop design criteria. The design criteria development demonstrated that adjustable height, head, body and foot sections were the major features, and adjustable gynaecological footpads and instrument placement (drawers) were the most important attachments. A wide variety of anthropometric data was applied to the development of design specifications and adjustments.

To produce a prototype for a new examination couch design developed from the ergonomic research and initial user surveys, the researcher collaborated with a medical couch manufacturer, Metron Medical Australia Pty Ltd. Through this collaboration, the developed criteria and specifications were applied to actual production processes.

User trials (a focus group, practitioner and patient surveys and personal communication) were conducted to investigate the effectiveness and efficiency of the couch prototype in a real clinical environment.



From the trials, modifications to particular couch features were identified if they were considered difficult to operate, unnecessary or uncomfortable for patients. For example, the mechanism of the gynaecological footpads, which

comprised three different adjustment controls, had to be simplified in order to avoid confusion and time consumption. The footpads had also to be equipped with straps or half a shoe to increase patient comfort and security.

The collaborating manufacturer will need to adapt the design modifications from the user trials and conduct more extensive engineering research and value analysis for a final production couch model. Nevertheless, this research successfully demonstrated the significance of ergonomics and user-centred design in developing design criteria more effectively, detecting usability problems before the couch is brought to the market, and in saving the manufacturer's overall product development costs.

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