

Postural-Support Devices

SUMMARY

AGENCE D'ÉVALUATION DES TECHNOLOGIES
ET DES MODES D'INTERVENTION EN SANTÉ

Postural-Support Devices

SUMMARY

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by François Pierre Dussault

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FOREWORD

POSTURAL-SUPPORT DEVICES

There is a vast range of postural-support devices (PSDs), especially seat cushions and back cushions prescribed to wheelchair users. In 2002, PSDs cost the *Régie de l'assurance maladie du Québec* (RAMQ) close to \$10 million. Their unit costs range from around \$80 to over \$800. Some products cost up to twice as much as similar ones, and certain institutions seem to favour providing upmarket products.

In addressing its request to the *Agence d'évaluation des technologies et des modes d'intervention en santé* (AETMIS), the RAMQ wanted 1) to know about the PSDs available on the market, along with their components and methods of construction; and 2) to establish the efficacy, safety and cost of these products.

Close to 500 products were identified in commercial catalogues and organized in spreadsheets. The cross-tabulation capabilities of spreadsheet programs (in particular by product class, cost, selection and eligibility criteria) nevertheless remain limited. Evidence on the efficacy and safety of these products is practically non-existent, although much is being generated in various research projects. Different classification models, four selection models and major evaluation criteria can nevertheless be retained as the starting point for designing an updatable selection grid.

In light of these observations, AETMIS recommends that the RAMQ establish a minimal selection grid and consider forming a consensus group composed of prescribers, users, suppliers and experts to integrate evidence into the grid as it is generated. The RAMQ should also consider implementing relational databases to cross-tabulate all the information relevant to administering its program, particularly current and emerging standards. As to the question of costs, AETMIS recommends that the RAMQ uses the information compiled henceforth to implement billing procedures in association with the institutions and suppliers.

In submitting this report, AETMIS hopes to provide RAMQ with information that will be useful in administering its technical-aids program. This information will also help concerned stakeholders in the Québec health-care system offer services that best meet wheelchair users' needs for postural-support devices.

Dr. Luc Deschênes

President and Chief Executive Officer

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The *Agence d'évaluation des technologies et des modes d'intervention en santé* (AETMIS) would especially like to thank **Rachid Aissaoui**, PhD, Associate Professor, *Département de génie de la production automatisée, École de technologie supérieure* (ETS), for writing the three-volume report that led to the preparation of this condensed version. We would also like to thank **Yue Li**, who co-signed part of the report and whose doctoral thesis, accepted in June 2003 at the *École polytechnique de Montréal*, contributed significantly to the Aissaoui Report.

AETMIS thanks **François Pierre Dussault**, PhD, Research Consultant, for his perseverance in seeing this project through to completion.

AETMIS is also grateful to **Benoît Bernatchez**, Occupational Therapist and Program-development Consultant at the RAMQ, for the work he accomplished as well as for the expertise and assistance he provided throughout the preparation of both the report and this condensed version.

The task of compiling the excerpts from the three-volume report and laying them out in this condensed report was greatly facilitated by **Stéphanie Adam**.

AETMIS also thanks **Pierre Vincent**, Librarian at the AETMIS Information Centre, for his assistance during the production of this report.

CONFLICT OF INTEREST

None declared.

SUMMARY

BACKGROUND

Postural-support devices (PSDs) fall under the general concept of technical aids. According to International Standard ISO 9999, a technical aid is “any product, instrument, equipment or technical system used by a disabled person... [for] preventing, compensating, monitoring, relieving or neutralising the impairment, disability or handicap.” PSDs are the components of a positioning system, which can include a seat cushion, a back cushion, legrests or footrests, armrests, a headrest or a neckrest.

There is currently a wide variety of PSDs on the market. Some are made by specialized companies; others, by Québec health-care institutions. Sometimes these devices are manufactured in collaboration by a public or private institution and a specialized company. The variety of construction methods used leads to significant variations in the invoices submitted by these institutions. The prices of PSDs billed to the *Régie de l'assurance maladie du Québec* (RAMQ) range from \$80 to \$800. The RAMQ has noticed that certain institutions most often offer upmarket products to almost all insured individuals. The RAMQ has noticed, moreover, that some products can cost up to twice as much as other similar products. The RAMQ reimburses close to \$10 million each year (2002) for the PSDs prescribed to insured individuals.

The RAMQ has no lists of standard components nor references to studies on the qualities and properties of commercially available devices compared with the devices manufactured by the institutions. This situation mainly concerns the seat cushions and back cushions usually prescribed to wheelchair users.

THE RAMQ'S QUESTIONS

In addressing its request to the *Agence d'évaluation des technologies et des modes d'intervention en santé* (AETMIS), the RAMQ wanted to know about the different PSDs available on the market, their different methods of construction and details of the components used; and to obtain a comparative study of the efficacy, cost, use and safety level of PSDs.

EVALUATION METHOD

Bearing in mind the RAMQ's questions, AETMIS undertook to identify comparative studies on PSDs by first consulting bibliographic databases. The search for information on the Web led to the Natural Sciences and Engineering Research Council (NSERC) Industrial Research Chair on Wheelchair Seating Aids, whose expertise remained available even though this research group had ceased operating in 2001. To review the current knowledge related to PSDs, AETMIS took the unusual step of approaching professor Rachid Aissaoui, the former principal investigator of that NSERC chair, now at the *École de technologie supérieure* (ETS), and proposed to sponsor him. This sponsorship led to the production of a three-volume report (known as the “Aissaoui Report”), which is summarized in this condensed report.

RESULTS

Currently, no system or process allows for an objective comparison of wheelchair cushions across manufacturers. A working group mandated by the International Organization for Standardization (ISO) to set wheelchair-seating standards has developed draft standards on a) the adoption of uniform terminology; b) the description of body posture and orientation; and c) postural-support devices and tissue-integrity devices. The vali-

dation project for International Standards ISO TC173/SC1 (16840-2, 2001-08-30) that is currently underway will propose methods for verifying the pressure-relief characteristics of wheelchair cushions.

The product survey conducted by professor Aissaoui yielded commercial information on 340 seat units, 79 back units, and 58 seat-and-back modules. Detailed lists and Excel spreadsheets accompany the Aissaoui Report and contain details of all the information on the seat cushions and back cushions found on manufacturers' sites, from which they have been transcribed in their entirety. Also, given that the authors did not have access to the products while drafting their report and that no standardized test has been conducted on these cushions, the manufacturers' claims about their products must be viewed with caution.

To date, few studies have been conducted on PSDs: twenty-two studies were found on seat cushions, and only three on back cushions. These studies nevertheless helped identify the different classification models for PSDs, four selection models, and the principal criteria and the principal methods used in their evaluation. The conclusions drawn in these studies also allowed for a preliminary selection to be made among the cushions based on their main component (e.g., foam, water, gel) or their shape (e.g., flat, contoured), and according to certain specific needs of users.

CONCLUSIONS

- Over 340 seat cushions, 79 back cushions and 58 seat-and-back modules have been identified in the North American market. Although several of these products are not available in Québec, they testify to the breadth of the product range and can serve as indicators for selecting the properties sought in the products considered for the people insured by the RAMQ.

- The cross-tabulating capabilities of the spreadsheets in which these products are compiled remain limited for other parameters such as different suppliers' prices for products in the same category, standards that will become applicable, selection and eligibility criteria, different suppliers' replacement costs, and so forth.
- It will be necessary to consider implementing relational databases to integrate this information and to cross-tabulate it for decision-making purposes. Also, technology-watch mechanisms would help keep these databases up to date and would make it possible to keep track of advances in the field of assistive technology.
- Implementing data-management tools adapted to the nature of PSDs will not be enough on its own to answer all the RAMQ's questions. In fact, much of the knowledge required to provide answers of immediate use to the RAMQ's operations is to a large extent still being generated. It would be advisable to provide for mechanisms to collect this knowledge so that it can be integrated into the decision-making process.
- Several criteria of immediate use can be compiled in a selection grid; they relate in particular to construction materials, quality of pressure distribution, interface shape, comfort, stability, thermal control, and cost. These criteria can be used as the starting point for developing an updatable grid.
- It will also be necessary to begin looking into the question of eligibility criteria, which are to some extent the corollaries of selection criteria.
- The lack of completely validated selection criteria should not prevent the RAMQ from asking suppliers or institutions for justification whenever significant price variations are observed.

RECOMMENDATIONS

Given the needs expressed by the RAMQ and the data that is available to respond to them, AETMIS recommends that the RAMQ:

- adopt the minimal selection grid with the criteria mentioned in the conclusions, namely, construction materials, quality of pressure distribution, interface shape, comfort, stability, thermal control, and cost;
- consider forming a consensus group composed of prescribers, users, suppliers and researchers expert in the field to design a more complete selection grid based on scientific evidence of efficacy and safety that takes into account the RAMQ's operational framework.

ABBREVIATIONS AND ACRONYMS

AETMIS	<i>Agence d'évaluation des technologies et des modes d'intervention en santé</i>
ANSI	American National Standards Institute
CCAT	<i>Conseil consultatif sur les aides techniques</i>
CONROD	Centre of National Research on Disability and Rehabilitation Medicine (Australia)
CRIQ	<i>Centre de recherche industrielle du Québec</i>
CSA/ACNOR	Canadian Standards Association / <i>Association canadienne de normalisation</i>
ETS	<i>École de technologie supérieure</i>
FIRA	Furniture Industries Research Association
ISO	International Standards Organization
MDA	Medical Devices Agency (Great Britain)
NSERC	Natural Sciences and Engineering Research Council
PSD	Postural-support device
RAMQ	<i>Régie de l'assurance maladie du Québec</i>
RESNA	Rehabilitation Engineering and Assistive Technology Society of North America
SSA	Shape-sensing array

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