The University of Sydney
Faculties of Health Sciences and Architecture
The Home Modification:
Information Clearinghouse Project

Protocol guidelines for systematic reviews of home modification information to inform best practice

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Introduction

A key objective of the Home Modification Information Clearinghouse's evidence based practice process is to develop a strategy for systematic evaluation of published evidence to assist in determination of strategies most likely to achieve best practice outcomes. This protocol has been developed to facilitate this systematic review process. This is based on but differs from the standard evidence based practice approach as originally developed in the allied health and medical domains. For instance, PEDro <www.pedro.fhs.usyd.edu.au>, OTseeker http://www.otseeker.com/>, Campbell <http://www.campbellcollaboration.org/> and Cohrane <http://www.cochranelibrary.com/enter/>. These approaches use only published results from randomised or quasi-randomised controlled trials to determine intervention. The background to reviews currently being undertaken using the home modification proforma is that they occur in a context where there is a historical absence of targeted randomised research addressing the needs of persons with disabilities.

Undertaking a review of the published evidence regarding Home Modification and Maintenance service interventions and outcomes is a complex process. First, one has to account for a large number of potential disability types and intervention methods, many of which differ according to their underlying characteristics. Second, there exist a large number of environment, activity and person factorial variation to be considered in making any recommendations concerning improved practice outcomes. Third, examining the causal or probable relationships between assessment, interventions and health, safety or functional improvement is complex because there are many different pathways through which service provision can influence outcome. Finally, the review process is complex because in order to locate relevant materials, the search strategies must be maximally inclusive.

Despite the absence of applied research directed at intervention comparisons for specific populations, there is a large amount of published material of relevance. For instance, in the housing construction domain a large number of guidelines already exist as do pockets of research which touch on the issue of concern but only in a passing or glancing fashion. What is needed is a method for locating this information and then relating existing knowledge to the new application focus. Because the starting place is different, the work that is needed must be of a more general nature and will not necessarily be comparative in the traditional sense. In addition, transparency of critique is critical because much of the existing published material has a limited research basis, is outdated or methodologically flawed.

In documenting the review protocol to guide the systematic review of Home Modification and Maintenance evidence the Campbell Systematic Review (CSR) Protocol has been adopted and adapted to guide us in this process. The CSR Protocol was considered the most relevant protocol as it was established to guide the review and synthesis of evidence of the effects of interventions and public policy primarily in the fields of social welfare, education and criminal justice.

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The CSR Protocol is based on the Cochrane protocol but is more inclusive of qualitative materials. It establishes a framework by which the aims and intentions of reviewers are explicitly stated and sets out strict requirements as to how a literature review is to be conducted. In the CSR Protocol, the method by which the review is to be undertaken is pre-established. In theory, this leads to a more directed review path and is thought to reduce the impact of reviewer bias on the review process. Greater levels of transparency and accountability are introduced as a result. That said, some flexibility in literature review design for each practice question is essential, as the reviewers needs to react to new information, which was not foreseen when establishing the Protocol.

Aims

An evidence based practice review is carried out to provide policy makers and researchers and practitioners a summary of the evidence as to the health impacts of Home Modification and Maintenance service interventions. To enable this, the HM Information clearinghouse searches need to be both comprehensive and sufficiently sensitive to identify the greatest number of relevant studies across the practice area.

Objectives

To identify and review, the main findings relevant to a particular Home Modification and Maintenance Service question in order to provide information about intervention in a rare or unusual problem, or to confirm, disconfirm or expand existing knowledge
To identify and code activity, person, environment and method outcome variables for the purposes of a meta analysis
To analyse the results for implications regarding to the Australian Home Modification and Maintenance service provision context to inform policy change and or additional research

Evidence Based Practice Question Posed

Problems arise everyday for Home Modification and Maintenance Services that could benefit from the application of appropriate knowledge. The type of practice question posed will differ depending on whether the knowledge being sought concerns assessment, intervention, evaluation or administration. The language of the keywords will also vary depending on the professional jargon, terminology and experience of the number and type of practitioners involved. See Figure 1

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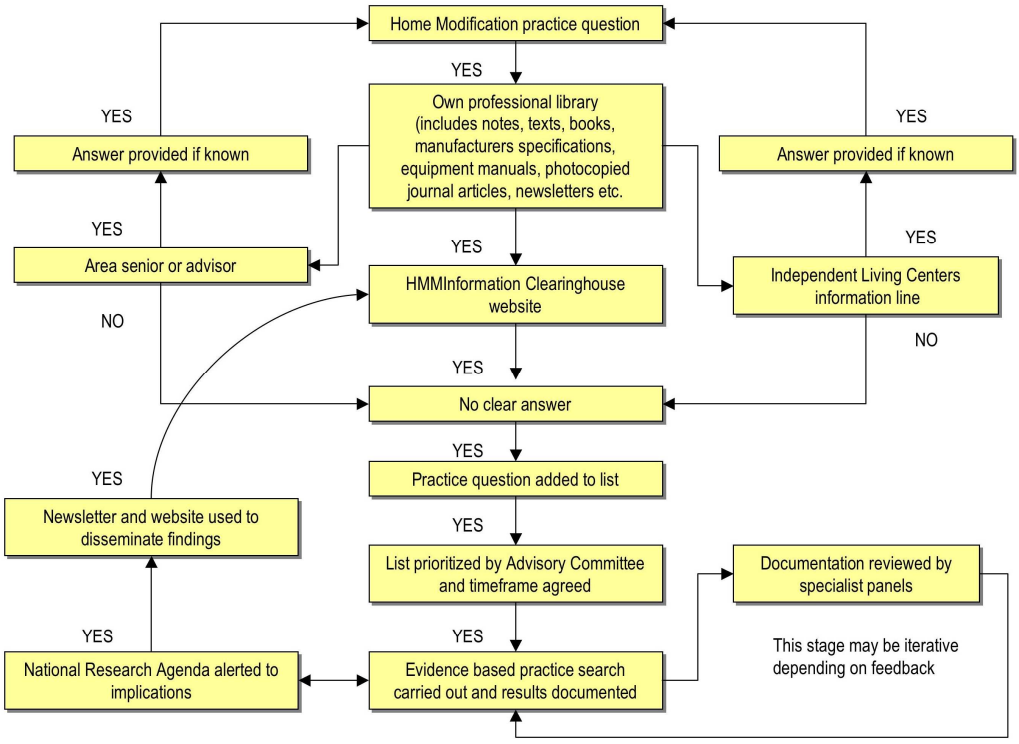

Figure 1: Generation and stages of an evidence based practice question in home modification

Question Refinement Strategy

Problems as raised by the area senior or advisor, Independent Living Centre and the HM Information Clearinghouse website need to be refined into an operational format that can be researched systematically by application of appropriate search criteria. According to Campbell protocol guidelines well-formulated questions occur in the context of an already formed body of knowledge (The Campbell Collaboration, 2001).

A number of evidence based texts suggest that question refinement follow a simple three part strategy: intervention, outcome and comparison (Taylor, 2000). However, this leaves the issue of target applicability and comparison implicit or poorly defined. Consequently, the HM Information Clearinghouse has chosen to refine its search terms on the basis of a five part analysis as illustrated in Table 1 following.

Problem	Intervention	Outcome	Comparison	Target population
Decks, ramps & paths	Reeded (ribbed) timber	Slip resistance	Sawn top timber	Mobility impaired
Grabrails	25 mm diameter	Grip strength	40 mm diameter	Older
Alarms	Visual signal	Safety	Auditory signal	Older

Table 1: Five part question refinement strategy

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Criteria for Considering Studies for a HMinfo Review

Types of Studies

In the strict form of the CSR Protocol, there is a range of criteria applied to determine whether a study is included in the review. The most important (and controversial) of these is the 'robust methodology' criterion. In the CSR Protocol, a study is methodologically robust and worthy of inclusion in a literature review (assuming other inclusion criteria are met) if the study utilises a methodology based on a randomised control or quasi-randomised control experiment/trial form where a no-treatment control group is included. However, while a properly implemented controlled experiment meets the robust methodology criterion, it is argued that limiting studies to be included in our review to randomised control experiments is inappropriate for a number of reasons.

First, true randomised experiments are almost non-existent in housing or Home Modification and Maintenance practice. For instance, expert opinion and anecdotal evidence are included in a HM Information Clearinghouse Review in the belief that 'natural experiments' can serve to highlight contextual variable of importance and useful to assess the impact of policy on behaviour and outcomes. Second, the social sciences have developed a range of statistical techniques to control for confounding factors without the application of randomised trials. The development and use of longitudinal data sets in particular facilitate the identification of the effect of policy parameters on behaviour and outcomes by using multiple observations of individuals over time. The effect of policy interventions, and net of the influence of an individual's other characteristics, can then be readily identified. Formal approaches such as these complement and can be supplemented by alternate approaches such as reliance on case studies, use of well-designed focus groups, and development of formal theoretical frameworks.

Types of Participants

All material retrieved shall be restricted to humans and will be of relevance to frail aged people, people with a disability and their carers' to enable them to remain at home.

Types of Intervention

Any. They could be directed at policy, consumers, and industry or service providers.

Types of outcome Measures

Primary:

Improved safety for consumers, carers' and/or service providers
Improved functionality for consumers and/or carers'

Secondary:

Improved comfort for consumers, carers' and or service providers
Improved aesthetics for consumers and/or carers'

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Search Strategies for Identification of Publications

HM Information Clearinghouse Reviews include a broader inclusion criteria based on the potential relevance of search results to the question being posed. Adoption of broader inclusion criteria requires that meta-analysis appropriately isolate and comment on research findings based on an appraisal of any perceived weakness in methodology or conceptualisation. This more inclusive strategy that was adopted deals more appropriately with the potential to undervalue qualitative and or theoretical research findings and is in line with other CSR protocol guidelines for review protocol such as that used by (Baldwin, Wallace, Croucher, Quilgars, & Mathers, 2002).

Our search strategies are as follows

1. The HM Information Clearinghouse libraries existing collection of materials
2. Standard electronic database search based on the CSR protocol guidelines
3. Legislative and regulatory documents
4. World Wide Web search using the 'Google' search engine plus a search of particular websites
5. Grey literature search
6. Anecdotal evidence

The Clearinghouse Library

All books, endnote abstracts and anthropometric and other material held in the clearinghouse library will be searched. This material will assist the reviewers to scope the problem background and design the search strategy. Any material of relevance will be photocopied and set aside for full analysis as per the strategy documented within this protocol.

Standard Electronic Database Searches

A wide range of databases are potentially relevant and each question requires that a decision be made about which databases are likely to be most relevant to the question in its refined format.

The databases available to us and that have been identified as having the highest potential relevance are as follows:

- Ageline (Ageing in psychological, health-related, social, and economic
- AMED (allied and complimentary medicine)
- API: Architectural Publications Index
- APAIS - Australian public affairs
- APAIS - Health
- ARCH (Architecture)
- Australasian Medical Index
- Avery Index to Architectural Periodicals

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- BUILD: Australian Building Construction and Engineering Database
- CAB Abstracts (agriculture, agronomy, crop protection, dairy science, and environmental degradation)
- Cinahl (nursing and allied health)
- Cochrane Controlled Trials Register
- Compendex Plus (engineering and technology)
- Current Contents (science, social sciences, arts and humanities)
- Dissertation Abstracts
- EVA: Environmental abstracts
- Expanded Academic Index ASAP (humanities, social sciences, environment, science & technology)
- Family (family and society)
- Geobase (physical and human geography, geology, mineralogy (on the Science Direct platform)
- Health and Society
- Inspec (physics, electronics, electrical engineering, computer)
- ISI Proceedings (conference proceedings in science, technology, humanities, and social sciences)
- Medline (allied health, health care, medical, biological, physical sciences)
- Oshrom – HSELINE, MHIDAS, RILOSH, CISDOC, NIOSHTIC (health, safety, toxicology, environmental health, biohazards)
- Proquest 5000
- Psycinfo (psychology, psychiatry, sociology)
- PubMed (medical and life sciences)
- Science Direct (life, physical, medical, technical sciences)
- Sociofile/Sociological abstracts
- UoS Theses (University of Sydney theses)
- Web of Science (science, social science, arts and humanities)

Home Modification and Maintenance relevant research is located in a variety of places including Universities, Human Services, Housing and Health Departments, charitable bodies and social policy organizations.

In addition, the bibliographies of all reports, papers and University of Sydney library books retrieved are scanned for any additional and potentially significant studies.

Once the databases to be searched are decided the definitions, headings and indexing categories are matched using the most appropriate keywords, synonyms, truncation and connectors. This process is illustrated in Figure 2.

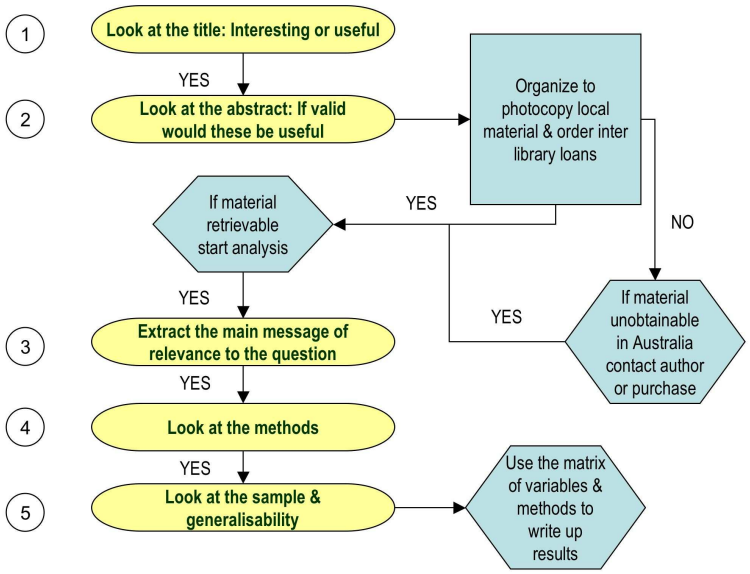

Figure 2: A flow chart of the steps in conducting a home modification review

Deciding Inclusion Criteria

This requires a number of steps such as deciding on a search timeframe, applicability frame, language and key terms. Key terms in this sense mean the specific language and or the manner of its use (Hawkins, 1988). Choice of key terms for instance can be problematic, as many have general or lay meanings that may not match standard professional usage or definitions and indexing utilised within the database being searched. In addition, many of the databases available are not Australian in origin and American not Australian spellings and or language is typical. In these databases, failure to check spelling and terminology can result in missing relevant materials. For instance, failure to attend to spelling (i.e. paediatric instead of paediatric) or preferred terminology (i.e. grabbar instead of grabrail) could significantly alter retrieval outcomes.

Primary studies will be generally limited to English as current funding is insufficient to manage large bodies of textual translation. The time frame for all searching will span no more than 50 years on the basis that technologies in housing construction and home modification practice have changed so substantially that material written prior to this will have limited or no relevance to current practice. Any material fitting our protocol will be included.

Search Terms:

The list of five keywords is used to generate a list of synonyms using general and professionally relevant dictionaries, thesaurus and glossaries. The list of synonyms is used to develop our search terms as illustrated in Table 2.

Connectors:

Any connectors chosen will be described, recorded, and logged in an excel spreadsheet in the format illustrated in Table 2. This table is included in the research review documentation of the final study as an appendix.

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Truncation Symbols:

The search terms to be applied are checked for maximum retrieval by ensuring plurals are not used and that the simplest form of the word stem is used in conjunction with truncation or use of wildcard.

Any truncation symbols used in searching will be recorded and logged in an excel spreadsheet in the format illustrated in Table 2. This table is included in the research review documentation of the final study as an appendix.

Database	Search strategy	Inclusion	Exclusion	Duplication
Web of Science	ramp* AND slip* AND resist*(material on ramp angles to prevent slips and falls)	**13**	7	**0**
Web of Science	(timber OR wood*) AND ramp* *(many of the articles talk about ramp loading and wood strengthening)*	31	22	3
Science Direct	ramp* (keyword) AND (weather OR wet OR water OR frost)(abstract/title/keyword)	57	52	4

Table 2: Sample data table illustrating documentation of search strategy

Exclusion Criteria

A review will exclude those articles that were 'out-of-scope' on a Home Modification and Maintenance outcome basis. In addition, editorials, general and unoriginal, or whole of subject books and conference papers will be excluded unless there is a clear indication that the publication has had a significant impact on the field. Fig 3 illustrates the stages at which review criteria were applied and materials will be appraised for exclusion.

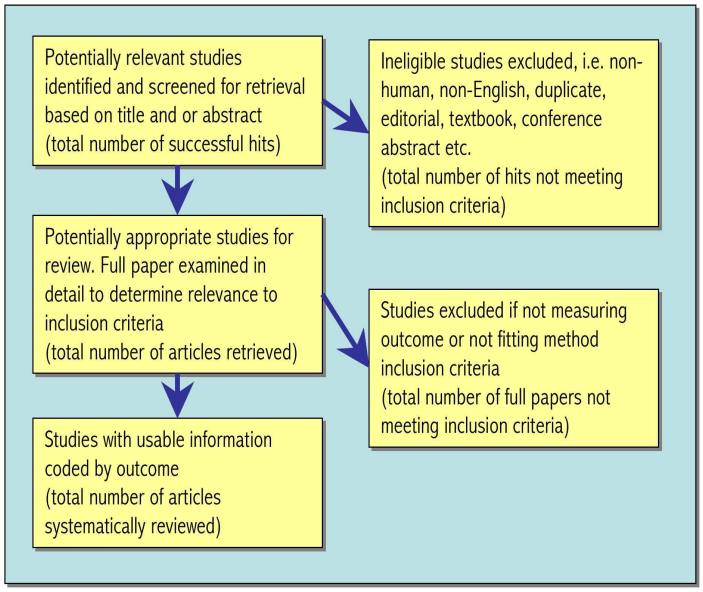

Figure 3: Review process flow

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Matrix for coding of home modification relevant material

Reference	Nationality	Main Findings	Process & issues	Activity							Person							Environment							Method						
				Variable 1	Variable 2	Variable 3	Variable 4	Variable 5	Variable 6	Variable 7	Variable 1	Variable 2	Variable 3	Variable 4	Variable 5	Variable 6	Variable 7	Variable 1	Variable 2	Variable 3	Variable 4	Variable 5	Variable 6	Variable 7	Systematic Review	RCT	Quasi Experimental	Observational	Case	Expert	Anecdotal
(Author, date)	Country of origin	What is the main finding of relevance to study	Comment on method and implications for data validity																												
(Author, date)	Country of origin	What is the main finding of relevance to study	Comment on method and implications for data validity																												

Table 3: Framework to ensure systematic data abstraction and reporting accuracy

For instance in the Reeded Decking proforma the variable were defined as

Activity - Coefficient of friction of ambulant gait and coefficient of friction of non-ambulant gait

Person – slips / trips / falls, centre of balance

Environment – decks, paths, ramps / slopes, precipitation (snow, rain), non-slip applications, maintenance

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Validity Assessment and Data Abstraction

In order to systematically analyse the type and quality of the research being conducted over the last ten years, a framework was needed that could classify research by methodology. Because systematic reviews are typically associated with hierarchies of evidence, being clear about what constitutes acceptable research and clarity about assigned levels enable meta-analysis. Results of a study may be described as negative (adverse outcome) or positive (favourable outcome) as shown in Table 4. For example previous researchers have noted that difficulties in determining the importance and causality relations of improvements in housing may be attributed to their multifactorial, complex nature and the degree that the chosen methodology controls for confounding variables and or fits with the research question being answered (Dunn, 2002; Thomson, Petticrew, & Morrison, 2002).

Some of the main methodology variables associated with Home Modification and Maintenance material are listed in Table 4: Study design definitions below.

	Level of evidence (Provided in descending order)	Type of study design	Study design reported	
			Negative (-1)	Positive (+1)
Methodology	0 (i.e. 0 =) highest	**Systematic review**	• The cut-offs for inclusion may be too high or too low. • The question under consideration may not be specified properly i.e. it may be too broad or too specific. • The results capture a snapshot of published research at a particular time interval so results must be interpreted in relation to currency of information and change in the body of knowledge being reviewed.	• This attempts to answer a particular research question in an evidence-based manner. • It provides policy makers with a summary of available evidence. • It effectively maps the inputs and outcomes under review.
	1	**Randomised Control Trial (RCT)**	• This assumes that variables can be controlled and groups appropriately matched • This assumes that randomised blind allocation of intervention is given ethical clearance by relevant human ethics review board • This is very expensive in terms of time and money. • There may be compliance and participant attrition problems. • Blinding and random allocation can be problematic.	• This is the 'gold standard' in health research. • Random allocation balances known, unknown and unmeasurable confounding variables • Greater confidence that conclusions are attributable solely to intervention manipulation. • Reduces selection bias • Blinding reduces measurement and performance bias • Provides evidence of causality

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	2	**Quasi experimental (i.e. no randomisation)**	• Because variables not fully controlled may exhibit selection, performance and measurement bias	• Remains experimenter controlled • Most reliable when variables of interest and controls for these made explicit
	3	**Observational (i.e. cohort studies, pre& post test studies, cross-sectional and longitudinal studies)**	• Can take a long time • Can be an expensive, large scale undertaking • Useful when randomised studies are inappropriate • external factors can change over time with panel or longitudinal data	• Most reliable observational data is cohort studies because there is no recall bias and can ensure baseline similarities between groups. • More reliable answers and less statistical problems than case control
	4	**Case (i.e. case series and case comparative)**	• No statistical validity • Hard to control for confounders as no controls • Subject to recall bias as retrospective • Difficult to demonstrate causality	• May generate hypotheses • Less expensive • Can have large sample sizes
	5	**Expert opinion/ Theoretical/ unsystematic literature review**	• May be based on hearsay • May not clearly indicate assumptions or method • May be faulty or inaccurate	• May assist in reconceptualisation of problem area • May add to knowledge in terms of scoping variables or measurement methods
	6 (i.e. 6 = lowest)	**Anecdotal material**	• May be based on hearsay May not clearly indicate assumptions or method • May be faulty or inaccurate	• May assist in reconceptualisation of problem area • May add to knowledge in terms of scoping variables or measurement methods

Table 4: Study design definitions

Source: Adapted from Baldwin *et al* (2002).

Defining Input and Outcome Relations

In order to determine input and outcome relations, a data collection matrix will be designed for each review as shown in Table 5. The relevant typology definitions are then circulated to the primary team members for review and comment. Following feedback, modifications are made before the usable studies are extracted, reviewed, and abstracted.

Legislative and Regulatory Documents Search

Relevant legislation and regulatory documents pertaining to the question will be identified and the original material will then be searched and included in analysis. This includes

Acts - Australian Political, Legislative and Regulatory Information Intranet

Building codes – Australian Building Codes Board online

Standards & handbooks – Standards Australia Premium online

Advisory Notes etc - HREOC online

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World Wide Web Search

Google has become the pre-eminent web search engine (Notess, 2003). Google offers its own database of indexed search pages along with another collection of URL's that it has not indexed such as duplicate URLs, redirected URLs, pages protected by access restrictions etc. The strengths of Google are its size and scope. For instance, it includes PDF, DOC and Post script file types in addition to traditional web pages. However its limitations mean that there are limited search features and it does not support full Boolean search.

Consequently, our World Wide Web search using the Google search engine will follow the same conventions outlined under key terms in the previous section on database searches but truncation and case sensitivity are unsupported. This means that plurals must be included.

The following Boolean combination will be applied instead:

Normal strategy	Google Strategy
'key term a' AND 'key term b'	'key term a' 'key term b'
'key term a' OR 'key term b'	'key term a' OR 'key term b'
'key term a' AND ('key term b' OR 'key term c')	'key term a' 'key term b' OR 'key term c'
('key term a' OR 'key term b') AND ('key term c' OR 'key term d')	'key term a' OR 'key term b' 'key term c' OR 'key term d'
'key term a' AND ('key term b' OR 'key term c' OR 'key term d')	'key term a' 'key term b' OR 'key term c' OR 'key term d'
'key term a' AND ('key term b' OR 'key term c') AND 'key term d'	'key term a' 'key term b' OR 'key term c' AND 'key term d'

Source: Notess (2003).

In addition to the standard search using key terms the following websites will be searched using their internal search engines:

- Department of Ageing, Disability and Home Care (DADHC)
- Family and community Services (FACS)
- Australian Institute of Health and Welfare (AIHW)
- Australian Bureau of Statistics (ABS)
- Centre for Accessible Environments (CAE)
- Joseph Rowntree Foundation
- Idea Centre

Grey Literature Search

This will involve specifically searching for manufacturers' specifications and journals not on electronic databases of potential relevance. For example the Independent Living Centre's Journal, The Technical Aid for the Disabled journal and Access by design which is produced by the Centre for Accessible Environments

Anecdotal Evidence from Practitioners

Any other material that meets inclusion criteria of relevance from specific Home Modification and Maintenance list serves or communication with the clearinghouse will be included as appropriate

Methods of the Review

Identifying Studies

One reviewer will screen the titles and abstracts of all retrieved records to identify obvious exclusions. A second reviewer will check the exclusion of other less obvious records, before rejection. Any disagreements will be resolved through discussion. A sample of no less than 10% of the material selected for inclusion will be screened by two reviewers to ascertain inter-rater reliability. Any disagreements will be resolved through discussion.

Assessment of Methodological Quality

The following criteria will be used to assess the methodological quality of included material:

1. Methodological soundness

2. Variable relevance

Overall quality of the studies will be summarised as "good" if both of the above criteria are met, "moderate" (one is met) and "possibly problematic" (neither are met).

Data Extraction

Two reviewers will independently extract data and compare a minimum 10% randomly selected sample of the material to be analysed. Differences in data extraction will be resolved by discussion. The reviewers will contact investigators to obtain information or data needed for the review that could not be found in published reports.

Data will be extracted on the following:

- Any statistical values
- Direction of results (positive or negative) - as defined above
- Funding mechanism (external versus internal, and industry funding versus other)
- Actual sample size (< 100, 100-999, >999 or as defined in included studies)
- Type of method
- Primary author
- Country of origin

Data Analysis

The primary analysis will consider the overall quality of the material selected for inclusion.

Timeframe for Reviews

Given that funding deliverables require that four reviews be completed a year, each review must be completed within an eighteen week period. The search process and the review and synthesis of the evidence are complex and time consuming. Consequently, depending on the review and amount of material to be searched, analysed, synthesised and documented the process may benefit from a longer timeframe. Should the reviewers believe this to be so; the issue will be raised for consideration at the project's Advisory Committee meeting as it will impact on the ability to deliver on a particular number of reviews. The proposed timeframe is as follows:

Week 1 – Refine question select key words, document search strategy

Week 2 – Search the Clearinghouse library

Week 3 – Commence the wider search

Week 4 – Complete search

Week 5 – Select for inclusion by title and organise inter- library loan

Week 6 – Collect and collate material, enter into endnote database for transfer to online bibliographic library

Week 7 - Select for inclusion by abstract

Week 8 - Inter-rater reliability sample taken and any anomalies identified and disagreement resolved by discussion of principle parties

Week 9 – Commence coding

Week 10 – Complete coding

Week 11 – Commence analysis

Week 12 – Commence documentation in systematic review report

Week 13 – Commence translation to industry factsheet and checklist

Week 14 – Commence translation to consumer factsheet

Week 15 – Send package out to specialist review panels

Week 17 – Edit on basis of feedback

Week 18 – Publish review on website

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Plans for Updating Reviews

Reviews will generally be updated at no more than 5 yearly intervals.

Potential Conflict of Interest

Any conflict of interest will be identified and acknowledged. The HMinfo Clearinghouse is committed to fair review of all material. Consequently, ensuring any conflicts of interest are dealt with consistently, transparently and with rigour remains important to us.

Listed below are the principal areas where conflicts may arise as adapted from those used by the National Health and Medical Research Council:

- direct involvement in the publication;
- any personal financial interest in the outcome of the review process;
- potential involvement as a researcher, or departmental/institutional colleague;
- any perceived involvement due to a family/personal relationship, either currently or during the past five years;
- if at any time there has been a verbal or written dispute between a reviewer and an author

Authorship

Systematic reviews are typically collaborative, so the issue of determining authorship will be decided prior to the review being commenced by the people involved. Any disputes will be resolved by negotiation of the principle parties following generally acknowledged academic criteria for authorship.

a) conception, design, analysis and interpretation (credit for conception and design must be decided at the beginning of a review);

b) drafting the article or revising it for important intellectual content;

c) final approval of the version to be published.

To qualify for authorship all criteria must be met, In general contributions like literature searching and acquisition of studies essential to the review process alone are not considered sufficient contribution for authorship.

Documentation of Results

The results will follow the previously agreed upon proforma developed and approved by the project's Advisory Committee. The Reeded Decking suite, available in the HMinfo Clearinghouse Resource Library, provides an exemplar of this process.

Specialist Review Panels

The selection and appointment of a specialist review panel for each of the three published formats will comply with the guidelines approved by the Advisory Committee

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