



Exploring the impact of primary health care research

Final Report Stage 2 Primary Health Care Research Impact project

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Preface

A little knowledge that acts is worth infinitely more than much knowledge that is idle.

Kahlil Gibran (1883 - 1931) Lebanese-American Poet Philosopher & Artist

Measuring the impact of primary health care research is an important but inexact science. While a research team has a great deal of influence on the outputs and immediate outcomes of their research project, the process of transferring research findings into practice and policy is convoluted and indirect. It can take many years for the findings of a research project to result in changes in health outcomes and health services. The longer the time, the more difficult it is to track impacts reliably and attribute them to the project. Changes to practice and policy are usually the result of evidence from a whole body of work, rather than from a single research project.

Translating research into practice and policy is a 'contact sport', as Jonathon Lomas of the Canadian Health Services Research Foundation once said in a meeting in Melbourne¹. However, there is no protocol for researchers to follow that will lead inexorably to research impact in their target area. Research impact is unpredictable, depending on the nature of the research findings, the credibility of the research team, timing, congruence of the findings with accepted practice and the policy, political and economic climate.

Making an impact is important for primary health care and for the broad discipline of primary health care research. Undertaking this project has added to our understanding of this topic.

Libby Kalucy
Project leader

Executive summary

This report presents the results of a study conducted in 2007 by the Primary Health Care Research and Information Service, on seventeen diverse primary health care research projects funded by national competitive grants in Australia. The study aimed to examine, from the perspective of the chief investigators (CIs), the impact of these research projects and to explore how their projects made an impact.

The project built upon preliminary qualitative work by PHC RIS in 2006³ analysing four research projects, which found the Buxton and Hanney Payback Framework⁴ provided an adequate methodology for gathering information and structuring a case study of research impact. The study reported here used a web-based questionnaire, based on the Payback Framework, to gather information from the chief investigators (CIs) of a larger sample (n=17) of Australian primary health care research projects funded by national competitive grants of at least \$80 000. The diverse sample included 11 intervention and 6 descriptive projects, targeted at practitioner, general practice, organisational or population level.

CIs reported extensive outputs beyond the expected peer reviewed publications, and considerable impact on processes and policies in health care as well as producing new knowledge and building capacity within research teams.

An overview of the impacts of this diverse sample of research projects shows that:

- Federal or State governments directly applied findings from four projects to decision-making (instrumental use);
- Seven of the projects contributed to improvements in service delivery at system or local level;
- In most cases impact went beyond localised effects on the practitioners, organisations and patients who took part in the research;
- Impact on research capacity included the awarding of eleven PhDs, further research funding and collaborations;
- The projects contributed to traditional knowledge production through 39 peer reviewed papers in 26 different journals and multiple other outputs.
- Most of these projects were recently completed at the time of the study, so more impact from these projects can be expected in future.

This project makes an original contribution to the understanding of research impact by analysing the extent to which research teams achieved their expectations of research impact². No project intended to make an impact in every domain. The intended impacts were most often achieved in areas under the control or influence of the researcher, such as researcher development, knowledge production and ongoing research. The number of expected and achieved impacts decreased with distance from the researchers' sphere of influence. For example, 77% achieved their expectation of providing information for policy making but only 31% reported their research had *influenced* policy making, a process beyond the researcher's control and sometimes awareness.

Partnerships between researchers and end users were of major importance for impact on both policy and practice. Participants perceived interpersonal strategies such as professional networks, the involvement of potential users, and presentations to policy makers were more important in achieving research impact than the dissemination of written information. Impact was more likely when research topics were congruent with current policy and practice agendas.

The study shows that these primary health care research teams have been working collaboratively, and spreading their findings by a variety of written, electronic and verbal means within the constraints of their research funding and employment. Research impact occurred largely through the networks of the research team. This study highlighted the role of organisations such as the Royal Australian College of General Practitioners (RACGP) and the Cooperative Research Centre for Aboriginal Health (CRCAH) as end users and facilitators of the use of research. The participation of researchers in these organisations contributed to the development of professional and curriculum guidelines and the organisations acted as network hubs, conference convenors and sources of information.

Assessing the impact in this study depended on CIs somewhat restricted view. CIs are most likely to be aware of short term impacts within their networks and sphere of influence, but less likely to find out what happens once their research findings are published in the peer reviewed literature or otherwise made available through the internet. Thus assessing impact by surveying CIs leads to a systematic bias and under estimates impact. In future work, consideration should be given to obtaining supplementary information from additional sources.

Recommendations to enhance impact

For Research Funders

To provide optimal conditions for future research impact, funders need to:

- encourage researchers to develop their project collaboratively with potential users and address a topic of current policy interest;
- provide a forum for researchers to share research findings with policy advisors and other potential users;
- provide ongoing support for researchers and research teams to achieve impact through their academic and professional networks;
- encourage researchers to document the impact of their projects.

Those allocating research funding need to include funding for researchers to:

- conduct meetings with potential end users;
- attend relevant conferences to present their findings;
- prepare and disseminate papers and reports as well as using other dissemination methods such as media articles and websites.

For Researchers

Researchers need to be proactive and opportunistic in disseminating their research findings. They need to:

- strengthen connections with policy advisors, health service organisations, research participants, professional organisations and the university;
- involve policy makers, opinion leaders, health service organisations and other potential users in the research, through advisory or reference groups;
- identify the relevance of the research to policy development at all levels: for consumer groups, service providers, peak bodies, health care organisations and different levels of government;



- participate in professional organisations, committees and networks and share their research findings through these positions;
- disseminate findings using appropriately targeted outputs tailored to the needs of users;
- maintain contact with those who have used the research findings in order to track further use;
- keep records of presentations, requests for information and publications, media stories, reports and other publications citing their research.

For the Australian Government

- Mechanisms (incentives) should be developed to encourage universities and academics to engage with their communities to facilitate research which is relevant to community needs.
- Where possible and appropriate it would be beneficial for policy advisors to be engaged in some aspects of funded research, (for example on assessment panels, advisory/working committees, development of topic / scope).
- Specific indicators of success in applied research and translation of research outcomes in primary health care, as part of the Excellence in Research for Australia (ERA) Initiative should be developed by the Australian Research Council.

For PHC RIS

PHC RIS needs to promote and develop easy ways for researchers to document their research outputs through the PHC RIS website and database.

Introduction

Pressure has increased for research funding to be accountable in terms of benefits and transfer of research findings into practice and policy. Interest in research impact was an explicit component of the 'Virtuous Cycle', the Wills Review of the NHMRC in 1999⁶, reinforced at the mid term review in 2004. PHC RIS commenced this study on assessing primary health care research impact in 2005, when Australian universities were implementing the first cycle of the Australian Research Quality Framework (RQF), which explicitly included the impact of university research as well as its quality. Subsequently, the RQF was replaced in 2008 by a different program, Excellence in Research Australia (ERA), with less focus on impact.

Research can make an impact within academia, if academic peers recognise its originality and it influences the development of the same or related areas within the community of peers. Such impact is typically assessed by publications in high impact journals, citations and research funding as well as peer review. Of greater interest in the context of this study is the societal impact of research outside of the peer community, and recognition by qualified end-users that quality research has been successfully applied to achieve clinical, social, cultural, economic and /or environmental outcomes.

Primary health care research has considerable potential to achieve impact on end users in a wide range of settings. Approached collaboratively, it can be highly relevant to practitioners and/or for policy decisions at practice, organisation, regional or national level. Diversity is a major feature of primary health care research - in topics across prevention, health promotion, treatment of acute conditions and management of chronic conditions; in populations or individuals; in multiple research disciplines and in diverse health care professions; in settings which include community, clinical, health services, health systems and populations; and in methodologies ranging from action research through to randomised controlled trials.

As primary health care gains greater recognition and prominence in policy and reform, there is a great need for rigorous primary health care research and capacity development. The primary health care research community in Australia has grown in size and capacity over the last two decades. The Australian Government has provided welcome funding support in the form of the General Practice Evaluation Program (GPEP) as a component of the General Practice Strategy in the 1990s, and the PHC Research, Evaluation and Development (PHCRED) Program since 2000. When competition for research funding is high, demonstrating the impact of primary health care research becomes ever more important.

International interest in assessing impact of research has led to the development of frameworks and methods for assessment. Assessment of impact on academia through research funding and bibliometrics has grown into a sophisticated craft, not easily applicable to broad fields such as primary health care which publish in a large number of journals. However assessment of clinical and societal impact is not straightforward, when the effects of a research project on practice or policy may not be apparent until 10-15 years after completion of the project. During this time, many other factors may influence these societal effects, making attribution difficult. If the purpose of assessing research impact is for accountability, it is logical and appropriate to examine more immediate outputs and effects for which researchers, research funders and policy makers can be held accountable.

A recent Rand report⁷ compared eight research evaluation frameworks, identifying four broad rationales – to increase accountability of researchers, policy makers and funding bodies; to steer the research process; to provide a means of advocacy for researchers and research groups; and to

provide input into the management process through better understanding and learning. Outcome measures used in these frameworks range from direct upstream outputs through to long term downstream changes. Levels of aggregation varied between low level (i.e. research grant) and high level (a whole research discipline). Timing was cross-sectional or longitudinal, and evaluation methods varied in number and types, from modelling to qualitative and semi-quantitative methods.

The Payback Framework developed at Brunel University by Buxton and Hanney⁵ was one of those included in the Rand document. This framework has an accountability objective, output measures, a low level of aggregation, a limited longitudinal timeframe and is based on a handful of qualitative and semi-quantitative methods. It has been used internationally in UK (North Thames NHS Survey 1999⁸, NHS Health Technology Programme 2007⁹) and in assessing publicly funded health and health services research in Hong Kong¹⁰.

PHC RIS commenced studying research impact of primary health care research in 2005. Our purpose was to develop a feasible way to assess the impact of primary health care research, and determine how different forms of impact came about, so that researchers could act appropriately to improve the impact of their work in whatever ways were appropriate.

During the first phase, in 2006, we explored the feasibility of using the Payback Framework to assess the impact of a small sample of competitively funded Australian primary health care research projects. The framework proved to be adequate for gathering information and structuring a case study of research impact, though the long interviews with chief investigators (CIs) and users of the research were resource intensive. This phase of the project provided rich information about the pathways to impact which had the potential in a larger sample to contribute to better understanding and enhancing research transfer/translation in primary health care.

This report presents the results of the second phase of the Primary Health Care Research Impact Project. Results from phase one have been reported elsewhere⁴. Phase two commenced in 2007, using a less resource-intensive online questionnaire to gather information from the CIs of a larger sample of projects.

The aims of Phase Two were to:

- find out what difference primary health care research makes to policy and practice;
- explore the pathways by which these research projects have impacted on their environment;
- analyse the extent to which these pathways are consistent with existing theoretical models explaining the movement of research into policy and/or practice;
- make recommendations on how these pathways may be enhanced.

This project makes an original contribution to the understanding of research impact by analysing the extent to which each research team achieved their expectations of research impact³. This is based on the belief that it is only appropriate to assess the impact of projects in domains and categories in which the project aimed to have impact. It also builds on the literature in focusing on an overview of a sample of research projects rather than on case studies and by exploring the pathways by which these projects impacted on their environment.

This project was approved by the Flinders University Social and Behavioural Ethics Committee in May 2007. Participants were informed that anonymity was not possible however they had an opportunity to suggest amendments to a draft of this report.

therefore excluded from analysis. The remaining three projects were complete except for submission of the final report or thesis, and were included in the analysis.

The study sample includes three projects funded by GPEP, ten by NHMRC, two by PHCRED through NHMRC, and two by CRAH. Twelve projects tested an intervention, while five were descriptive. Details of the projects included in the sample are provided in Appendix 1 with a summary in Appendix 2.

Questionnaire design

The first phase of the Research Impact Project piloted the use of the Buxton and Hanney Payback Framework⁵. Our findings recommended adding a new domain of impact, 'Research Transfer', with scope: (1) to assess enhanced pathways and relationships for research transfer to policy makers, organisational decision makers, practitioners and consumers and (2) to improve university engagement with its community, in this case the primary health care sector. We also modified the domain of knowledge production to include conference presentations and other project outputs, including media stories, recognizing that primary health care research has many outputs with a role in knowledge transfer in addition to peer reviewed publications. We added categories in other domains to include influence in policy development at an organisational, local, regional, national or international level and use in clinical practice. Our modified Payback Framework which informed the development of the online questionnaire is shown in Table 1.

The final questionnaire included a screening question to determine if each proposed impact was *expected* by the research team, and a subsequent question to indicate whether it was *achieved*. We did not ask this screening question for impacts such as peer reviewed papers and conference presentations because at the time of the project these knowledge outputs were not defined as impacts under the Research Quality Framework instead being regarded as measures of quality. These items have been excluded from some of the analyses.

To explore the pathways to impact, the questionnaire included items on forms of dissemination as well as the inclusion of potential research users in the design, conduct and dissemination of the research. These items were informed by the Payback Framework and by the literature, particularly the linkage and exchange model of research translation¹¹. A copy of the questionnaire is in Appendix 3.

Table 1 Buxton and Hanney Payback Framework Modified* for PHC RIS study

Domain	Scope*	Categories used in this study
Research transfer	<p>Improved university engagement with the community and the health care sector.</p> <p>Enhanced pathways and relationships for research transfer to policy makers, organisational decision makers, practitioners and consumers.</p>	<p>Enhanced university engagement with user groups.</p> <p>Enhanced relationships for research transfer.</p>
Knowledge production	<p>Peer reviewed publications, citations, Journal Impact Factor.</p> <p>Other primary outputs – publications, presentations, websites, media.</p>	<p>Number of peer reviewed publications.</p> <p>Number conference presentations.</p> <p>Other primary outputs – publications, presentations, websites, media.</p>
Research targeting, capacity building and absorption	<p>Better targeting of future research</p> <p>Development of research skills, personnel and research capacity</p> <p><i>*Critical capacity to utilize appropriately existing research (deleted)</i></p> <p>Staff development and educational benefits.</p>	<p>Further research opportunities</p> <p>Number PhDs</p> <p>Staff development</p>
Informing policy and product development	<p>Improved information base on which to take political and executive decisions.</p> <p>Implementation or influence at an organisational, local, regional, National or international level.</p> <p>Education/ training policies or audit and evaluation criteria.</p> <p>Clinical or regional guidelines.</p> <p>Inclusion in a systematic review.</p> <p>Inform product development.</p>	<p>Provided information for policy making</p> <p>Influenced policy making</p> <p>Provided information for organisational decision making</p> <p>Influenced organisational decision making</p> <p>Was used in education</p> <p>Was used in guideline development or systematic review</p> <p>Informed product development</p>
Health and health sector benefits	<p>Implementation in clinical practice</p> <p>Qualitative improvements in process of service delivery.</p> <p>Equity ie improved allocation of resources at an area level, better targeting and accessibility.</p> <p>Increased effectiveness of health services. ie increased health.</p> <p>Revenues gained from intellectual property rights.</p> <p>Cost reduction in the delivery of existing services.</p>	<p>Used in clinical practice</p> <p>Led to improvements in service delivery</p> <p>Led to more equitable service delivery</p> <p>Led to improved health outcomes</p> <p>Intellectual property gains</p> <p>Led to cost savings</p>
Broader economic benefits	<p>Contribution to a healthy population.</p> <p>Wider economic benefits from commercial exploitation of benefits arising from research</p>	<p>Led to improvements in population health</p> <p>Economic impacts</p> <p>Other social impacts</p>

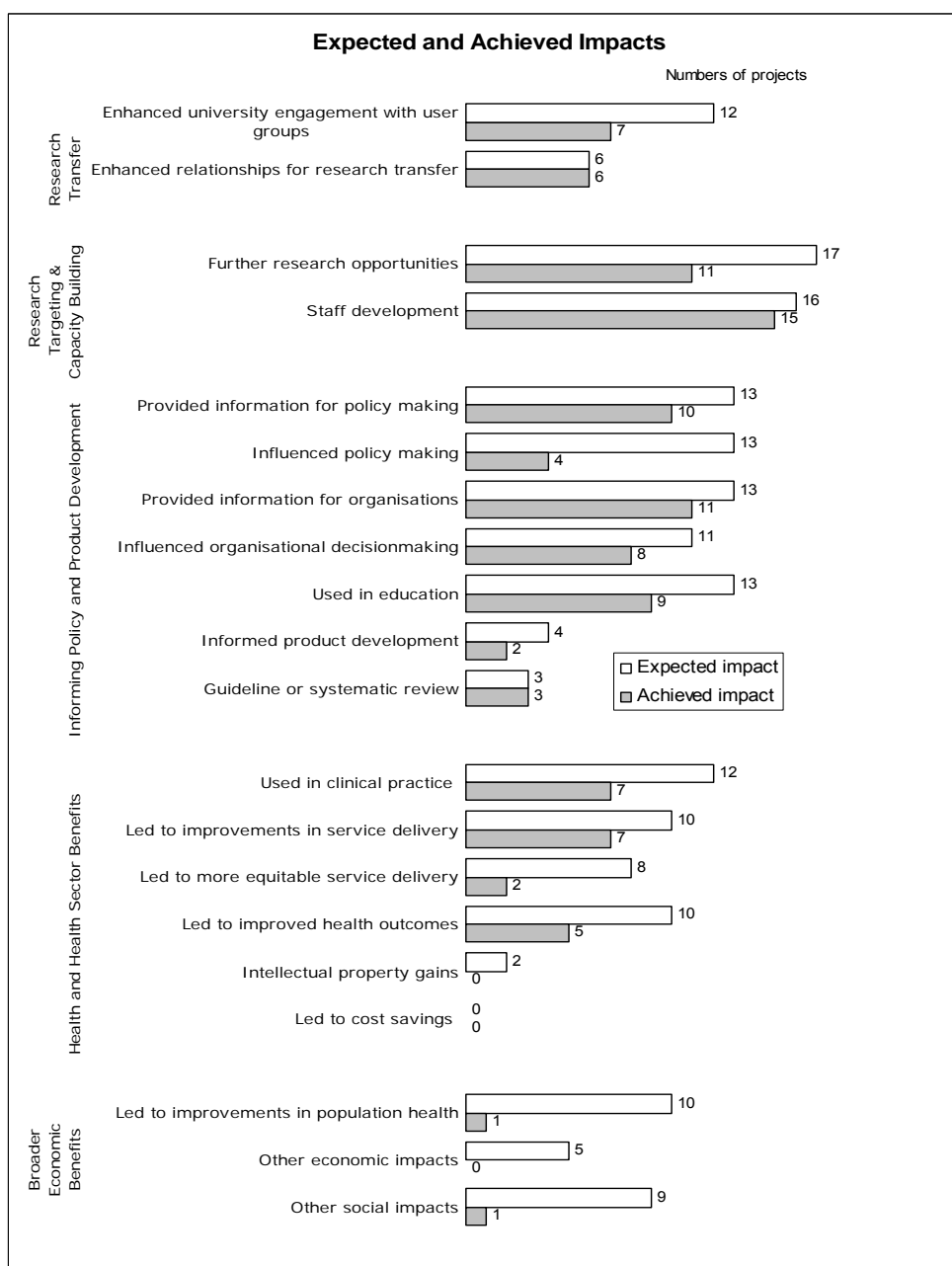
* Note, additions to the Buxton and Hanney Payback Framework are indicated by bold text, with deletions in italics.

What difference does Primary Health Care research make?

Impacts Expected by Chief Investigators

Chief Investigators (CIs) expected impact mostly in the research targeting, capacity building and absorption domain. CIs of all 17 projects expected that their findings would “lead to further research opportunities”, while 16 expected “staff development, educational benefits or higher degrees to be earned”. Thirteen CIs expected impact in the domain of informing policy and product development. Very few CIs expected their primary health care research projects would lead to longer term impacts of product development, intellectual property gains, cost savings or economic impacts (Figure 2).

Figure 2 Numbers of Expected and Achieved Impacts



Impacts achieved overall

At least 85% of the expected impacts were achieved in areas such as enhanced relationships for research transfer, staff development, providing information for organisational decision-making and use of research in guidelines or systematic reviews (Figure 2). Lower levels of impact were achieved in areas which take longer to occur, and are more distant from the research team's influence and control. For example, 77% achieved their expectation of providing information for policy making but only 31% reported their research had influenced policy making, a process beyond the researcher's control and sometimes awareness. Appendix 4 shows the categories in which impact was achieved for each project.

Impacts achieved by domain

Research Transfer

University engagement with user groups

Seven of the ten projects which intended to have impact in this category achieved some engagement with managers, practitioners and organisations. Organisations such as the CRAH and the RACGP facilitated this impact.

Enhanced relationships for research transfer

The six projects which intended to achieve impact in this category all achieved enhanced relationships for research transfer by working with policy makers during the research, working with an Advisory Committee, and participating on a government committee. This is described in more detail in the section on pathways on page 21.

Knowledge Production

The research teams associated with projects in this sample produced multiple and diverse outputs, including many conference presentations, presentations to potential users, media stories and newsletter articles as well as the more traditional journal articles. The number and diversity of primary outputs bore little relationship to the proportion of impacts achieved (Appendix 4).

A total of 39 peer-reviewed publications had been produced at the time of this survey, ranging from seven publications in two projects to zero publications in four projects. The projects which produced four or more publications were either large scale complex studies involving multiple partners, or clinical trials. Invitations to write from prestigious journals and organisations encouraged writing for publication. For example, the researchers from the Patient Safety in GP study received invitations to write on the subject from the World Health Organisation, the NHS and a high impact journal.

The publication process was affected in at least two projects in which energy was diverted to other activities with the completion of a funded study, and the research team was dispersed.

*As this project was being concluded, the [project] in which part of it was based came under considerable organisational and funding pressures. This interfered with realisation of possible peer reviewed papers by diverting energies that might otherwise have been used in publication into other activities. Subsequently the research team has become fragmented across multiple universities, which has made it difficult to conclude the publication process.
(CI Caring for Carers)*

The 39 peer reviewed publications from this sample of projects were published in 26 separate journals, illustrating the large number of specialty journals relevant to primary health care

research. Journal Impact Factors were available for the journals of 22 of the 39 articles produced as shown in Appendix 6. Most articles were published in journals with Impact Factors less than 3.0, with the exception of two articles in the British Medical Journal and one article in Rheumatology. It should be noted that Journal Impact factor is associated with academic not societal impact.

Research Targeting and Capacity Building

This is the domain where respondents most frequently expected and achieved impacts from their research. Eleven CIs reported their projects had led to further research at the time of the survey, which fits with CIs undertaking programs of work rather than separate research projects. Fifteen CIs indicated the projects had resulted in increased skills for research staff, leading to promotions and academic positions. Eleven PhDs had been completed in these projects at the time of the survey with several still to be completed.

This study was the centrepiece of my PhD which I was awarded in 2005. I learnt a lot about research in the process and also was successful in my application for the position of A/Prof in Primary Health Care. (Treatment of low back pain)

I went on to be a CI in an NHMRC Project grant, was successful in two applications for post doc funding and found new collaborations both in Aust and internationally opening up to me. (Socioeconomic disadvantage in chronic disease management)

Impacts in research targeting and capacity building

- The **Lateral Epicondylalgia** project led to follow up research funded by the NHMRC, and to side studies such as a systematic review.
- The **Socioeconomic Disadvantage** project led to further NHMRC funding and a post doctoral position.
- The **Asthma Care** project led to follow up research which included a National Evaluation in the area of asthma care. Research partnerships were developed and an asthma research unit was further developed and attracted PhD students.
- The **Caring for Carers** project led to collaboration and an ongoing work program with Hong Kong.

Informing policy and product development

This domain addressed providing information for policy development as well as influencing policy development; providing information for and influencing organisational, local or regional decision making; use in education, product development and inclusion of the findings in guidelines or a systematic review.

Policy development

Respondents reported more success in providing information for government policy development than in having their research was used, a process which is beyond the control of researchers and sometimes beyond their knowledge.



Research findings used instrumentally¹ by governments at national and state level.

- Evidence on the value and problems regarding the 3+ Asthma Plan from the **Asthma Care** project contributed to a new model of MBS item numbers for asthma.
- The **ABCD** project informed the development of major Indigenous Health initiatives (Continuous Improvement projects and the Healthy for Life Program). It influenced Northern Territory policy making as all primary care services are now expected to adopt the approaches developed in the project. The approach has also been adopted in WA, NSW, QLD and SA.
- The **Attitudes to Lesbians** project findings contributed to a Victorian Government action plan and cultural awareness training for GPs.
- The **Urban Locational Disadvantage** project report is being used at State level to argue for increased funding allocations for lower SES communities.

Organisational decision making

Eleven projects provided information useful for decision making in local or regional organisations. Eight of these indicated that their information influenced decision making, though few projects gave details on how the findings were used. The numerous services and service managers involved in the ABCD, Learning from Action, Support for Mothers and Caring for Carers projects were able to incorporate lessons and project methods as the projects progressed. The findings from the Attitudes to Lesbians projects were incorporated into the RACGP curriculum guidelines through the committee work of the CI, as she describes:

I volunteered to be on the women's health working groups for the RACGP curriculum review. I then became chairperson of that group and so had some influence in adding sexual orientation to the curriculum in numerous areas. Through the RACGP curriculum review, cultural awareness now includes diverse sexual orientations.

Use in Education

The results of nine projects were included in undergraduate, post graduate or continuing education teaching programs, sometimes through the research team members having a role in these programs.

Research findings used in education

- The findings of the **Lateral Epicondylalgia** project were in use in the physiotherapy programs in at least three universities and may also be used overseas, as project findings were presented to several groups in Europe and New Zealand and an article has been translated into Italian on request.
- The **Screening for Chlamydia** project findings were incorporated into teaching for a medical education program. The research team obtained further funding to provide an education program for GPs and for the public.
- The **Learning from Action** report was used to inform a post graduate management education program.
- The results from the **Attitudes to Lesbians** project and the **Doctors Patients and Computers** project were incorporated into RACGP curriculum through the involvement of CIs and collaborators on RACGP committees, illustrating the importance of such professional organisations as intermediaries in the use of research findings.

While the pathway is not direct, the Patient Safety in GP project may have conceptually influenced the RACGP training curriculum on dealing with mistakes in general practice.

In 2008 the GP training curriculum includes more specific focus on dealing with mistakes and errors in clinical practice. It is possible that the research projects in this subject in recent years such as the TAPS study have raised awareness of the importance of this subject and influenced the GP training curriculum.

Informed Product Development

Only one project described how the research had contributed towards product development. The Cognitive Screening in GP project involved the development of a computer program for cognitive screening based on the research, however the program was not complete at the time of report.

Use in practice guidelines or a systematic review

Three CIs achieved their aims in this category.

Research findings used in systematic reviews

- Findings from **Support for Mothers** were incorporated into a Cochrane Review of interventions to reduce post natal depression.
- A paper from the **Treatment for Low Back Pain** study was incorporated into a systematic review on the use of prolotherapy to treat low back pain.
- The researchers of the **Lateral Epicondylalgia** study completed a systematic review on lateral epicondylalgia which included their study and has been published by the NHS Database of Abstracts of Reviews of Effectiveness.

Research findings used in Standards and Guidelines

- The findings from the **Patient Safety in GP** study have influenced the Standards for Accreditation of General Practices to include a system for reporting and rectifying errors.
- The findings from the **Attitudes to Lesbians** study will be adapted into guidelines for GPs and will be distributed widely.

Health and Health Sector Benefits

This domain includes impacts on the health sector, implementation of the research findings in practice, improvements in service delivery, cost savings, improved health outcomes, contributions to social equity and gains in the exploitation of intellectual property.

Implemented in Practice and/or Service Delivery

A number of CIs reported localised impact on research participants, supporting the idea that impact is most likely within the sphere of direct experience and influence of the research project. Six of the projects which tested an intervention found that research participants continued to use the intervention after the study period as illustrated by the following examples.

- *"Many of the participating general practitioners informed us that they will include combined screening in their clinical practice."* (CI Screening for Chlamydia)
- *"Already some of the GPs that I interviewed have altered their clinical practice to start facilitating disclosure of sexual orientation."* (CI Attitudes to Lesbians)
- *"GPs in the study have fed back that they have changed practice in how they offer and discuss prenatal testing with their patients and would use the [decision aid] if it were available."* (CI Prenatal Screening)

Other CIs indicated that their projects had achieved broader impact by contributing to improvements in service delivery beyond the study participants.

- The approach used by the ABCD project is used widely, as Continuous Quality Improvement (CQI) is now a required method of working in all Northern Territory Indigenous health programs and is spreading to programs in other states.
- The Patient Safety in GP project demonstrated that most errors are due to system failures. It has raised awareness of the importance of addressing medical errors. Problematic packaging of immunisation vaccines was a specific example of error rectification identified in this study. After this example was published and raised with NSW Health, the problematic packaging is no longer provided to practices.
- The findings from the Learning from Action project contributed to formal and informal learning programs for managers and to support services for managers in the Queensland Aboriginal and Islander Health Council.
- The Prenatal screening project developed a decision aid to assist women facing decisions about amniocentesis to screen for birth defects, which is now in use in several hospitals beyond the initial project.

Contributed to more equitable allocation of resources, better targeting of resources or improved access to services

Two projects described such impacts at the project level, with the potential of longer term impacts if the project interventions were taken up more widely. The ABCD project improved access to health services for Aboriginal people and achieved impressive health outcomes in participating Aboriginal communities, justifying allocation of resources in this way. The Screening for Chlamydia project prevented complications in identified women who would not otherwise have been screened, while also supporting the feasibility of wide spread screening in the future.

Cost Savings

No projects expected or stated that they had achieved any cost savings to the health system.

Improved Health Outcomes

Improved health outcomes occurred or potentially occurred in some cases through benefits to trial participants and through changed behaviour of practitioners who had taken part in a trial. It is not known if such changes have been sustained after the completion of the project. Some examples of potential benefit, mainly in the sphere of influence of the projects, are shown below.

- The **Attitudes to Lesbians** study which interviewed same sex attracted women and their GPs about the women's care needs and raised awareness among participating GPs.
- **Caring for Carers** raised awareness locally of the needs of carers of those with mental illness, which potentially led to improvements for carers.
- The **Prenatal Screening** project led to better decision making by women facing amniocentesis.
- The **ABCD** project was the only one able to quantify the health benefits achieved. The large scale program implementation was rigorously evaluated with health outcome data showing impressive health improvements in participating populations.

Intellectual Property Gains

No projects expected to or achieved any income through exploitation of intellectual property.

Broader Economic Benefits

Improvements in population health

Population health level improvements are not easy to demonstrate or attribute to an individual research project, although trial participation can lead to health improvements for a limited population. As described above the only project to show an improvement in population health was the ABCD project which researched a wide-scale intervention in Aboriginal communities, showing greatly improved health outcomes in the patient population involved in the trial.

Other economic and social impacts

No projects in this study expected or achieved any other economic impact. Only one project claimed to have had social impact: Support for Mothers put a range of services in place for new mothers. While all projects have social processes and some of these may have led to social improvements, this is not easy to demonstrate.

Summary

Chief Investigator survey responses show these seventeen diverse primary health care projects influenced policy development and service delivery in practice, as well as knowledge, researcher development, further research and relationships for research transfer. Some projects were used in policy as well having localised impact on participating providers and managers.

No project was intended to make an impact in every domain of the impact framework used in the survey. Intended impacts were most often achieved in domains such as researcher development, knowledge production and ongoing research. These were under the influence of the research team, were within their field of awareness, and could be achieved within a limited time period. The number of expected and achieved impacts decreased with distance from the researchers' sphere of influence and field of awareness.

As well as being a long term process, policy change usually depends on evidence from systematic reviews and syntheses of a body of research, rather than non-replicated evidence from single projects. Therefore CIs were realistic when they neither expected nor achieved impacts on population health or economic factors to follow from these disparate individual projects.

What are the pathways to impact?

Respondents were asked to rate how important and influential different research outputs had been, and to comment on how their project had achieved each category of impact. The finding that emerges is one of interaction over time between project processes, partnerships, outputs and impacts, rather than any clearly delineated pathways.

Research Transfer

Research transfer is a process that happens through networks. In their logic diagram Buxton and Hanney² identified the interfaces between researchers and potential users relating to research impact. The results of this study illustrate the connections between primary health care researchers, participating health workers and patients, facilitating organisations and universities.

In order to obtain their competitive project funding, the CIs in this project had established a track record, with existing networks and connections. The data showed that many took part in committees and organisations in their area of interest.

CIs reported a long lead time to develop a project and gain support from a range of stakeholders. Recruitment of practitioners was facilitated by professional bodies and GP organisations. Advisory Committees were a common means of engaging policy makers and thought leaders. Action research projects which engaged multiple health services and whole communities were able to mobilise wide networks.

To disseminate their findings, CIs reported they engaged with wide networks to present project findings to many different audiences.

The study linked a large group of NSW GPs with a major research project at the University of Sydney. Relationships with NSW Health, the federal Department of Health and Ageing, DVA, and the RACGP were developed with the university to facilitate various parts of the project.
(CI, Patient Safety in GP)

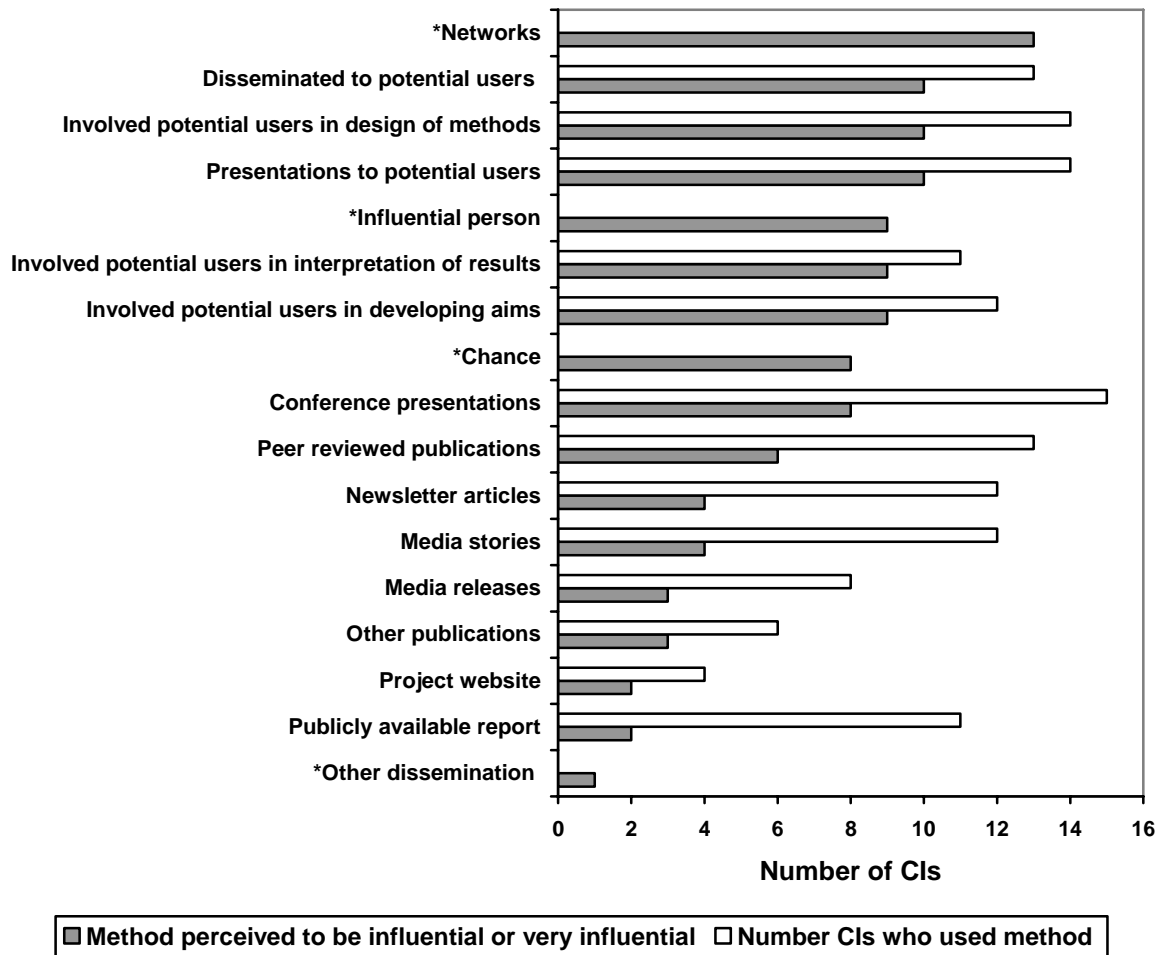
Some projects were conducted collaboratively by more than one university and several organisations. A number were facilitated by organisations which provided a networking hub through their communication processes and events. The Royal Australian College of General Practitioners is one organisation which appears to play a prominent role in achieving research use through its curriculum committees, guideline development activities and special interest groups. The Cooperative Research Centre for Aboriginal Health had a major role in facilitating use of research projects for benefit of the aboriginal communities.

Knowledge Production

As well as being included as an 'impact' in the Payback Framework, publications are a potential means of achieving use of research findings. Although fourteen of the seventeen projects had produced a total of 39 peer reviewed publications at the time the questionnaire was completed, only six CIs perceived that peer reviewed publications had been very or somewhat influential in achieving research impact. In one case the influence had come about through ongoing debate in the literature regarding the efficacy of the intervention trialled. While CIs used many methods to disseminate their findings they perceived interpersonal dissemination methods, especially those delivered to potential users, were more influential in achieving impact than written material such as

peer reviewed publications and publicly available reports, where the researcher was unable to see potential users' reaction to the findings (Figure 2).

Figure 2 Research transfer methods used, compared with CIs' perceptions of their influence in achieving research impact



* No data available on number of CIs who used these methods

Analysis showed little if any relationship between the number of publications, presentations or other project outputs and the achievement of impact aspirations overall or in particular categories (See Appendix 4). This is not unexpected, as there is no logical reason for the existence of a 'dose-response' relationship between outputs and impact.

Associations between the proportion of expected impacts achieved and involvement of users in different stages of the research were also explored. The pattern shown in Table 2 suggests higher proportions of impacts were achieved when users were involved, but the sample size is too small to reach statistical significance.



Table 2 Effect of involving users in the research on the achievement of expected impact

Percentage of expected impacts achieved	Users involved in clarifying aims		Users involved in designing methods		Users involved in interpretation of findings		Users involved in dissemination	
	Yes	No	Yes	No	Yes	No	Yes	No
< 50%	2	4	3	3	2	4	3	3
50% +	10	1	11	0	9	2	10	1
TOTAL	12	5	14	3	11	6	13	4

Research Targeting and Capacity Building

CIs' responses demonstrated that the research process was a pathway to developing staff skills in all aspects of research, indicated by higher degrees.

I went on to be a CI in an NHMRC Project grant, was successful in two applications for post-doc funding and found new collaborations both in Australia and internationally opening up.
(CI Socioeconomic Disadvantage)

Partnerships and contacts established during the course of a research project often led to further collaboration on further projects.

- **The Asthma Care project** worked with partners established during the study on further work in the primary care field. Presenting the findings of this project overseas stimulated further research partnerships.
- The findings and the relationship building of the **Learning from Action project** led to the commissioning of a further project addressing the funding and regulation of Aboriginal primary health care services.
- The **Caring for Carers project** gave rise to collaboration with Hong Kong and a continuing work program of international comparisons with morbidity among carers there.
- The **Treatment of Low Back Pain project** led to collaboration on papers with other researchers into prolotherapy for chronic painful conditions and a second trial of prolotherapy and exercises for painful Achilles tendonitis.
- Through taking part in the Advisory Committee for the **Urban Locational Disadvantage project**, a Local Government became an industry partner in an additional funded research project.

Involvement with multiple related projects, building on the existing partnerships and skill sets enhanced the research team's ability to apply for further grants to progress the body of work, due to their improved track record.

- The **Lateral Epicondylalgia project** led to further funding for a study of other treatments for the condition. The research team had also been able to conduct side studies in parallel with the main study, such as a systematic review and the influence of tennis elbow on the sensorimotor system and the effects of time and treatment on these impairments.
- The **ABCD project** was designed to implement the Continuous Quality Improvement approach in health services. A follow up project is investigating wider implementation of the same approach. This project emerged directly from the recognition of the success of the original ABCD project. The researchers are also engaged in a number of other projects to explore how similar approaches could be applied to other aspects of health and social services, thus further spreading the successful CQI approach.



- The **Urban Locational Disadvantage project** led to an additional NHMRC funded project to do a comparative study of location, social capital and health amongst urban indigenous residents.
- **The Screening for Chlamydia project** led to funding for a project designed to educate both the public general practitioners about the combined chlamydia and Pap test.

Informing Policy and Product Development

Impact in this broad domain was associated with policy makers being involved in the research, CIs being on relevant committees, and the findings being incorporated into curricula and guidelines, often through facilitating organisations. Impact was more likely if the topic was congruent with policy agendas, and had champions.

Involvement of policy makers in the research informed policy development

Involving policy makers in research has been a focus of much work in the area of research transfer in recent years. Several projects were undertaken in close consultation with policy makers.

On the ABCD project, policy makers were CIs as well as senior clinicians, program managers and other stakeholders. The Northern Territory Government had a strong sense of ownership of the project, to which it contributed funding, and was closely involved at all stages as illustrated by this excerpt from a government document early in the project's development.

To enhance our routine auditing capacity, we have also commenced a five year research project with the School of Health Research, funded by the State/Commonwealth Research Issues Forum, to trial an enhanced system of intensive audit and feedback of chronic disease information to 20 communities across the Top End.¹²

The strong ownership by government as well as the project's success in achieving health outcomes and becoming embedded in the health service management culture may be the key to the expansion of the program.

Other projects in our sample engaged policy makers but were not seen as government projects. For example:

- The Screening for Chlamydia project indicated that a senior policy maker was "supportive of the intervention", and staff from one branch of the Department of Health and Ageing were "mindful and supportive".
- The Support for Mothers project researchers "had informative discussion with senior staff who had management responsibilities" in the area of interest.
- The Urban Locational Disadvantage project consulted extensively, including four workshops with policy makers from State and Local Government where preliminary results were presented. Policy makers were connected to the project through the workshops and the Advisory committee, and received copies of a specially written report. The researchers had little evidence of the outcome of this consultation process but had informal feedback that the project findings were being used in arguing for increased allocations of funding for disadvantaged areas.
- The CI of the Asthma Care project worked closely with policy makers. The findings influenced the development of the 3+ Asthma Care Plan and revised Medicare numbers for asthma management.

Involvement with multiple related projects enhanced policy impact

- Researchers working on the Asthma Care project were also involved in a national evaluation of the Asthma 3+ plan which led to the development of a new MBS item number.

Chief Investigator's participation on committees

- The CI of the Attitudes to Lesbians study participated in a State Government Advisory Committee which provided a pathway for including the research findings in committee discussions.

Incorporation of the findings into education programs and professional guidelines

The dual role of some CIs as teachers and researchers provided a pathway for the use of research findings in educational programs:

- Lateral Epicondylalgia
- Support for Mothers
- Screening for Chlamydia
- Treatment of Low Back Pain
- Urban Locational Disadvantage projects.

In several cases participants were aware of their findings being used in other university teaching programs. The pathway to use was uncertain but this may have occurred through professional networks, publications, workshops or conference presentations.

The Audit and best practice in chronic disease (ABCD) project "*specifically sought to influence educational curricula and training programs as a strategy to strengthen capacity in use of CQI concepts. This was done through engagement of people with responsibility for such programs in the research.*" (CI, ABCD project)

Three projects in this sample had their results included in systematic reviews, which can be a pathway to inclusion in professional and clinical guidelines. In two of these cases the systematic review was written by the research team themselves as a side study to the project.

Facilitating organisations

This study highlighted the role of organisations as end users of research and as facilitators of the use of research. The participation of researchers and their contacts in professional organisations such as the RACGP can contribute to the development of professional and curriculum guidelines (Attitudes to Lesbians; Doctors, Patients and Computers). The Patient Safety in GP project may have achieved this through diffusion of ideas and raising awareness rather than specific input.

Many organisations host networking opportunities and conferences, distribute research funding, assist with the recruitment of research participants, and are willing to provide representatives for Advisory Committees, as well as acting as a network hub and source of information. The Jean Hailes Foundation played a prominent role in the Menopause study by providing the educational resources used as an intervention.

One organisation which was highlighted in this study was the Cooperative Research Centre for Aboriginal Health (CRCAH). The participant from the ABCD project credited the CRCAH with facilitating the research-industry links which led to the research findings being used in two major government initiatives.

The collaborative approach to development of research projects in the CRCAH is designed to enhance research transfer. The action research approach of this specific project is also designed to enhance research transfer through engagement of providers and policy makers in the research project, in interpretation of findings and in responding to research findings. (CI, ABCD Project)

Many respondents had presented to professional groups at unnamed professional events, seminars and conferences, some which had been organised by facilitating organisations.

Presentation of research findings at professional meetings and conferences was an important part of raising awareness of the study findings. (CI Patient Safety in GP)

Congruence with Government agendas enhanced policy impact

During the Screening for Chlamydia project, chlamydia was high on the agenda of both ACT and Commonwealth Governments. Chlamydia awareness campaigns were conducted in the media, and the Commonwealth Government's National Sexually Transmissible Infections Strategy was launched at the end of the data collection phase of the study. The research findings had not led to any policy impact at the time data were collected for this research impact study, but conditions looked favourable.

Champions

While nine participants indicated that the impact of the project was assisted by a person of influence, only one gave any details. The Urban Locational Disadvantage project report was launched by Ilona Kickbusch, the then Adelaide Thinker in Residence, who reinforced the issues raised in this substantial project. The CI considered this was likely to have improved the impact of the research.

Health and the Health Sector

This domain covers short and long term impacts in health service delivery, clinical practice, improved health outcomes, social equity, cost reduction, and intellectual property. As stated previously, the main impacts achieved in these projects were the shorter term ones, not long term changes in social equity and cost reduction. The pathways towards these impacts, particularly on practice and service delivery, echo those of other domains – the experience of taking part in a research project, the collaborative partnerships with providers and organisations in the community, inclusion in educational programs and curricula, and raising awareness of research findings by flexible dissemination to multiple audiences.

The experience of taking part in a research project led in some circumstances to changes in clinical practice. The adoption of an innovation by participants depended on how useful they found it and whether it fitted with their ideas. An influence on the adoption of the Screening for Chlamydia findings was that when conducted as part of a Pap smear it obviated the need to take a sexual history, which GPs considered was a barrier to offering chlamydia screening. More research and development is proposed for the impact to be extended beyond the project.

Impacts on service delivery as well as on the practice of individual clinicians occurred when the project was embedded in the health services community, who became aware of the issues through direct experience or presentations.

Five projects in our sample achieved impact on service delivery through working closely with health services and embedding the research in their needs and concerns. Together these projects illustrated the power of Action Research and Continuous Quality Improvement methods to lead to concepts becoming established in networks and organisational routines to the extent that they become accepted practice.

In some cases these impacts came about directly through service managers and practitioners being involved in the projects. In other cases improvements in service delivery occurred through education sessions for practitioners, which meant project findings were reaching practitioners beyond those actually involved in the project.

- Audit and best practice in chronic disease (ABCD) project involved and influenced policy makers, managers and practitioners in all levels of the project, the main focus being at the primary health care centre level through the introduction of Continuous Quality Improvement (CQI) concepts and tools. The action research approach and the participation of many services managers and practitioners led to embedding of CQI methods in everyday service delivery.
- The Learning from Action project involved health service managers in learning groups. The many improvements in management practice aimed to enhance service delivery.
- The Patient Safety in GP project involved a large group of GPs, policy makers and prominent GP organisations in various parts of the study.

The power of community based research is illustrated by the Support for Mothers project which was strongly supported by many multidisciplinary health practitioners and community services in several municipalities. This project conducted a controlled trial to test whether providing a range of services to support new mothers reduced the incidence of post natal depression. The project found that the intervention was not successful in reducing the incidence of post natal depression, but generated much enthusiasm among practitioners, and many leaders of practitioner groups perceived (unspecified) beneficial changes had occurred as a result of the program. While it was inappropriate to continue to provide the services for the purpose of reducing post natal depression, the project illustrates the power of involving many community organisations and practitioners as a pathway to research impact. It also illustrates the risks of embedding interventions which do not prove effective.

Inclusion in an education program

Including research findings in educational programs is a pathway to wider impact on practice beyond the research participants. The findings of several projects were included in educational programs as discussed elsewhere, through CIs with dual roles as educators, and through facilitating organisations (see Use in Education, p17).

Raising awareness

Raising awareness of problems locally or more widely was another way in which projects had impact. The Caring for Carers project was an epidemiological study conducted by the team responsible for the Consulting and Liaison in Primary Care Psychiatry (CLIPP) mental health shared care program. The team interviewed carers of mentally ill people, and analysed an existing large data set as well as health service data relating to the CLIPP program and other mental health services. Findings highlighted the needs of carers in the local area and the toll of caring for the chronically mentally ill. Through discussions within clinical administration of the area health service the project led to the introduction of regular multidisciplinary case conferences with attention to carers' needs.



The Patient Safety in GP project also worked through raising awareness. A large group of GPs and prominent GP organisations were involved in various parts of the study and findings were presented at professional meetings and conferences. The project seems to have influenced its environment through prompting an improved culture of safety and through raising awareness of the importance of addressing medical errors. Standards of accreditation on general practices have recently been expanded to include a system for reporting and rectifying errors noted by members of the practice.

Participants described a plethora of seminars, workshops, meetings and discussions. Outcomes attributable to these specific pathways are not documented and the effects of such presentations on thought and behaviour are usually unknown. However some presentations to potential users led in direct impact, as in the following example:

The decision aid has been shown to midwives who are requesting copies more and more. It has been used in several midwives' study days. (CI Prenatal Screening)

A number of participants commented on the importance of conferences, and commented on their need for financial support to enable travel and conference attendance.

Impact on health outcomes

As in previous categories, impact could occur for the patients involved during a trial intervention, or could result from adoption of the research findings more widely in practice and service delivery.

Many participating projects measured positive health outcomes in their participants. One of note was the Screening for Chlamydia study which detected cases of chlamydia which would not otherwise have been treated. Another was the ABCD study which documented improvements in measures of health outcome in chronic disease management for patients of the remote medical services in which the study was conducted, because of the improvement in quality of processes of care.

Adoption of research findings in practice and service delivery would have potential effects on health outcomes, which could not be assessed for the recently completed or still incomplete projects in this study.

Longer term impacts

This study is not in a position of clarify how longer term impacts can be achieved. Two projects reported some impact in social equity for the people participating in the projects. No CIs recorded effects in cost reduction or intellectual property.

Broader economic benefits

Economic benefits are expected to follow from improved population health. As described above, several projects studied had findings which led to improved health for participants and others contributed to health policy. While many were able to describe how their research could conceivably lead to economic benefits, such as through better treatment, and prevention of illness, or through better health policy or health services, no project measured these benefits or was able to provide any actual evidence of impact or pathway.

Theoretical models of pathways to impact

The third aim of this project was to analyse the extent to which these pathways are consistent with existing theoretical models explaining the movement of research into policy and practice. Some insights can be gained from our findings though the sparse online survey data prevents a comprehensive analysis.

Linkage and exchange

The Canadian Linkage and Exchange model of research transfer¹¹ advocates involving potential users in all stages of the research, so as to ensure that the research meets their needs and that those making policy decisions have a personal stake in using it. This model informed our survey which asked participants whether they involved potential users in their research. Responses suggested uptake of research findings by health services and in clinical practice was most likely in those organisations which were closely associated with the research team, lending credence to the linkage and exchange concept as well as to the concept of sphere of influence. However, quantitative analysis is limited by the small numbers. The study found that impact was related to personal contact and the experience of contributing to the research process. Knowledge developed in this way can be described as embedded in the social processes that gave rise to it, reflecting the interests, values and concerns of the participants.

Social embeddedness and social capital

The study of how a social context affects the development and construction of knowledge, using the insights of social epistemology,⁹ has been proposed as the next wave of knowledge transfer and exchange research.

Two concepts which are helpful in explaining our findings are the concepts of social embeddedness and the related concept of social capital. These concepts have been applied in the area of primary health care reform in Canada¹³ and have been raised as important for the study of the operation of networks in research translation¹⁴.

The concept of embeddedness arose in the field of economic sociology¹². Social embeddedness incorporates social relationships and networks and the effect of friendships, trust, reciprocal obligations and personal networks on economic outcomes. The economic outcomes which result from these social relationships are said to be a result of these relationships and thus are socially embedded¹⁵.

Social capital is a closely related concept which has been defined as *"the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit"*.¹³

The social capital of the CIs, that is, their reputation, influence, trustworthiness, participation in professional associations and decision making fora and their connections with government decision makers, has proved to be critical to achieving research use. Indeed the 'track record' of the CI is critical in selling the ideas, mobilising resources and forming the collaborations which lead to the project being funded.

Social capital is a factor in obtaining grants and commissions and in developing the personal authority which allows one to be heard and to have influence. Research performance generates

social capital, which generates research impact, which generates influence, which generates more research and stronger social capital, and so on. A research project provides the *raison d'être* for networks to be created and maintained but the legacy of the research project is that the networks are there to enhance the impact of subsequent projects.

Embedded research arises through participation and involves a lengthy process of negotiation with potential users and the community in which the intervention will be trialled. The context for research impact to occur is therefore constructed and jointly negotiated before the project begins. Projects can therefore have impact even in the early stages as the three incomplete studies included already were able to record impact.

A number of examples in this study show that when research was strongly embedded, with many partners, there was more potential for it to stay embedded and therefore have impact by being used or applied. The ABCD project is one such example. However, also consistent with the model is that impact may be independent of the actual research findings. The Support for Mothers project was a very large project implemented in multiple local government areas with the involvement of many people and organisations. The intervention did not result in any reduction in the specified outcome measure of post natal depression, but community members were enthusiastic in their support for the principles of the intervention and some of the changes made have endured in the practice of individuals, a testament to the power of social embeddedness. In the Attitudes to Lesbians, Screening for Chlamydia, Caring for Carers, and Prenatal Screening studies, practitioners participating in a trial were likely to incorporate the intervention in their continuing practice, presumably because they considered the intervention benefited their patients and their work practices.

There are concerns about embedding as yet unproven interventions in a work environment, if such interventions are sustained even if the research demonstrates that they are ineffective or worse. In order to test interventions it is necessary to engage with many organisations and service providers, so as recruit them to the study and obtain their cooperation to incorporate the practices in their work routines during the course of the study. It is then not simple at the end of a study to remove interventions which have been incorporated into work routines, even if they are shown to be ineffective.

The role of organisations as facilitators of this social embeddedness was a fresh finding from this study. These organisations helped spread impact beyond the project, and their extensive contacts and networks made it more likely that the research findings reached an appropriate audience. They convened conferences and seminars, encouraged the participation of practitioners in research, involved researchers and others in committees to further develop professional curricula and guidelines, and provided the structure on which networks and collaborations are built. The CRC for Aboriginal Health provided many of the research/industry links upon which the ABCD project was structured. Similarly, the RACGP played a significant role in facilitating several of the projects studied, in recruiting GP participants and in providing a forum for the input of the results into special interest committees and therefore progressing the results into decision making, curriculum design, and professional guidelines.

Role of ideas

A recent development in the field of research transfer is the proposal that ideas rather than research evidence influence policy^{16: 17} and that the ideas which are used are those which fit the interests of and are carried by powerful groups¹⁷. The methods used in this study were not suited

to testing this proposal, but there is reason to believe that the Patient Safety in GP project raised awareness of safety issues. Congruence with government interest (or not) was a factor in the uptake of several projects but the extent to which this was through the traverse of ideas is unknown.

Communities of practice

Another theory gaining currency in research transfer is situated learning through communities of practice (CoPs)¹⁸. CoPs are based on a social theory of learning through the experience of interacting with other people in an area of mutual interest, often using online communities. The concept has been widely applied in research transfer both in facilitating the uptake of research evidence by practitioners¹⁹ and in involving policy makers with researchers²⁰. The facilitation of the spread of knowledge through personal relationships is congruent with our findings. While we found facilitating organisations to be supportive of the uptake of research findings, again our data are not of sufficient detail to recommend any facilitated network structure.

Discussion

The findings show that areas of most frequent impact were those which were most immediate and over which the research team had some control and influence, but also those which the team was most likely to know of. Such impacts included developing research capacity, undertaking further research, and producing information to inform decision-makers in policy and practice. Once in the policy or practice environment, research findings were more likely to be used if decision makers were familiar with the research through prior involvement, if the research topic was congruent with the policy agenda, and when champions were involved who were part of influential networks.

A strong theme in our findings from both the first⁴ and second stage of this research project was that interpersonal connections mattered. More CIs perceived networks to be somewhat or very influential on research impact than any other factor of influence. Collaborative research with other universities, health service organisations and practices, links with policy makers, and personal connections with senior people with influence and the right connections could bring research findings to a decision making forum where they could be used. These were the channels by which impact happened. The extent of alignment of the research findings with Government priorities and with tides of opinion influenced the uptake of research findings.

CIs reported that the impacts they achieved were almost entirely in the categories they expected. However, the number of impacts achieved fell short of that expected, particularly in the categories furthest from the influence of the researchers. The fact that very few results were achieved outside the domains where respondents expected to achieve impact suggests that expectations are important and maybe predictive of the areas of impact.

Appendix 5 provides a comparison between the findings of this project and five other studies which have assessed the impact of funded research using the Buxton and Hanney Payback Framework. The impact achieved in these 17 projects is comparable to that in other studies of research impact^a. However, this PHC RIS study showed a higher proportion of projects (58%) resulted in at least one PhD compared with 21%, 25% and 38% respectively in NHS Health technology program 2007⁹, North Thames NHS survey 1999⁸ and Hong Kong 2007¹⁰.

Use in clinical practice was very similar in this PHC RIS study (41% of projects) and in the NHS technology program 2007 (42%), and improved health outcomes were reported in 29% of this study projects compared to 32% in the North Thames survey. Fewer projects in this study (23%) reported awareness of influencing policy making (though 58% provided information for use in policy), in contrast to 73% in the NHS Health Technology program 2007 and 36% in the North Thames NHS Survey 1999. This difference may be due to the questionnaire used in this study separating this item into two questions about providing information, and information being used in policy.

Lack of information on longer term impacts, such as intellectual property gains, cost savings, improvements in population health, economic impacts or other social impacts was a feature of this study as well as of the three other studies using the Payback Framework. This is consistent with the methods used in the Payback Framework, which most readily identify shorter term outputs and impacts⁷. The length of time taken to achieve longer term impacts, and the problems of attributing such impacts to any individual research project are two of the difficulties in identifying longer term impacts.

Dissemination

The role of dissemination in the achievement of research impact deserves attention. The researchers in our sample used a wide range of dissemination activities. They presented their work many times to different audiences, and wrote for publication in journals, newsletters, reports, websites, and media. This study shows that research leaders assumed responsibility not only for conducting the research successfully, but also for raising awareness of the research process and findings through a range of dissemination methods. In some cases this included advocating for the research findings through their personal and professional networks, such as committees and advisory boards. The picture that emerged was of substantial energy and effort being put into dissemination.

When this study was conducted these 17 projects had produced 39 journal articles. The pattern of peer reviewed publications shows an increase to 53% of articles published in journals with Journal Impact Factors (see Appendix 6), compared with 43% of articles in a study undertaken by PHC RIS in 2001²¹. This may be due to more journals being indexed, as well as researchers selecting indexed journals due to the increasing importance for academics of publishing in journals with an Impact Factor. A wider range of journals was used than in 2001, and the increasing use of Bio Med Central journals suggests the growing influence of open access publishing.

Journal publications are essential for the long term documentation of research findings so they can add to the body of knowledge world wide. However their role as a pathway to societal impact of research is less clear. CIs did not provide evidence of uptake of research findings through peer reviewed publications, except for one project which generated considerable debate in the literature and an article which was translated into Italian. The seventeen CIs considered that interpersonal approaches were more influential than publications and other less personal outputs. While this supports the importance of personal relationships as facilitating impact, it may also be that authors are rarely aware of impact which could be attributed to their publications, except by chance encounters. There is no systematic mechanism for researchers to be made aware of such use. Citation indexes and web downloads reveal the extent to which documents have been accessed and used, but not the impact on policy or practice. Even if a publication is cited in a policy document or

quoted by a policy maker or minister, which is some indication of policy impact, authors may not be aware of such occurrences.

Limitations of the study

One limitation of this study was the 29% response rate to survey, which limits quantitative analysis of the results and generalisations from this study. One of the main reasons for the low response rate was the difficulty of contacting mobile primary health care researchers, and to a lesser extent their lack of response to the invitation to participate. The other was the number of projects which were not completed at the time of the survey in mid 2007, despite careful selection to include in the sample frame only projects commenced after 1999 and due for completion by 2006.

Another limitation is that projects in the sample were in different stages of completion. As three projects were yet to be completed at the time of the survey, and others were very recently completed and were still writing for publication, it is possible that further impact would be achieved over time. The analysis and discussion are confined to the data collected by the questionnaire. The results underestimate the impact of these projects, as we have become aware of further impacts and outputs through conferences and networking opportunities in the close knit world of Australian primary health care research. The collective impact of the projects is thus a work in progress and must be viewed as a snapshot and not a definitive statement of eventual impact.

This study relied on CIs reporting the impact of their projects on knowledge, research, policy and practice, and how those impacts had been achieved. This in turn depended on whether there had been any impact by the time of the survey, and if so, whether the CI was aware of it.

CIs could only report on impacts that had already occurred when this study was conducted. CIs were not in a position soon after the completion of a project to identify long term impacts on population health and economic benefits, nor could they usually attribute these to their project. The longer the time period since the conclusion of the research, the more difficult it is to determine whether any changes have resulted from that piece of research or for other reasons. That being said, impacts did tend to accumulate early during the project and CIs reported a number of impacts from several projects which had not submitted a final report (or PhD). The time factor limited the achievement of 'downstream' impacts beyond research skill development and completion of project reports and other publications.

These findings are consistent with the description of the Payback Framework in a recent report by the RAND Corporation⁷, as a research evaluation framework with an accountability objective, with a focus on output measures (goods and services directly produced from the research projects), and shorter term outcome measures, based on a small number of qualitative and quantitative methods of measurement.

CIs became aware of impacts through personal experience, by assessing reactions to conference and other presentations of their findings, and learning about other reactions from people within their networks. Some responding CIs completed the questionnaire with input from other members of the research team, which enlarged their sphere of awareness. In other cases responses reflected only what the CI knew about the impact of the project, which depended on how closely they were involved if the team had dispersed during the project.

Relying on CI reports of impact introduces a bias towards the localised impact of research, as a CI is most likely to be aware of impact within their own networks. This is reinforced by a study by the

National Institute of Clinical Studies in 2003 that surveyed 63 recipients of NHMRC funding grants and found that NHMRC projects had mainly localised effects on national health target areas²².

While the online questionnaire was more efficient than interviews, it yielded less information than obtained during interviews in the first stage of this project. Within the responses are some inconsistencies, which reduced the credibility of the reported impact.

The Buxton and Hanney Payback Framework informed the data gathering and analysis. Although we modified the framework after Stage 1 of our project, we found that the categories need further refinement. In particular, there is overlap between the categories of *Informing organisational decision making* and *Leading to improvements in service delivery*. The first category is strongly associated with the second. We also found overlap between *Leading to improved health outcomes* and *Leading to improvements in population health* and found the location of population health under *Economic Impacts* as incongruous. In addition, there was some confusion between impacts and pathways, with peer reviewed publications being considered an impact in the Framework, as well as being a potential pathway to impact.

Further research on research impact

Although there are some limitations, this study shows that it may be feasible to use a questionnaire to assess systematically the research team's perception of the impact of their research. However, the questionnaire used in this study should be refined to reduce length and areas of duplication. Consideration should be given to obtaining information from more than one team member, and from other sources such as internet searching. A revised questionnaire could contribute information to an end-of-study evaluation by funders.

Nason et al²³ used the Payback Framework to examine the economic and social impacts of Health Research Board Funding in Ireland. They state that the Health Economics Research Group is currently developing a 'light touch' questionnaire based on the Payback Framework, rather than a detailed interview with the researcher. This reinforces the value of the methods used in this study. They also found that direct outputs from research are relatively easy for researchers to identify but longer term outcomes are more difficult. While researchers are unlikely to become aware of all the impacts of their research, more can be done to document impacts when these are known.

Conclusions

These seventeen recent primary health care research projects had direct relevance to policy and practice, as shown by their considerable impact on processes and policies in health care, knowledge production and building research capacity among the teams. The impacts were achieved through a combination of the collaborative approach taken by these projects, extensive dissemination efforts making the most of the researchers' professional networks and social capital, and facilitating organisations.

Research impact comes about through complex and therefore unpredictable social processes. A research project and its environment interact in multiple ways, and few rules apply. In retrospect, the apparent pathways to impact may seem coherent, but each project has been undertaken in a different environment and has achieved impact in different ways. While impact is never fully predictable, the lessons for researchers to improve their chance of making an impact are to take partnerships and collaborations seriously, use them to ensure their topic is relevant to current policy and practice agendas, and disseminate their work actively and skilfully, using their networks to raise awareness of the findings.

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Appendix 1: Brief project descriptions

ABCD

Full title: **Audit and Best Practice in Chronic Disease (ABCD)**

Research type: Intervention

Status: Complete

Funder: AHMAC and CRAH

Funding amount: AHMAC \$458,500; CRAH \$288,903

Last year of funding: 2006

Project summary:

Modern continuous quality improvement (CQI) approaches provide a theoretically coherent and highly acceptable framework for improving the quality of chronic illness care in Indigenous primary care services. The study embedded a CQI approach in 12 participating Aboriginal community health centres. It achieved impressive improvement in a number of key indicators of the quality of chronic illness care. These include improvements in systems and processes of care and in health outcomes indicators for diabetes control. A focus on chronic illness care rather than preventive services resulted in relatively little improvement in preventive care. The project showed that health centre systems are amenable to improving the delivery of processes of diabetes care to a level which is comparable with or better than national data. Successful actions and strategies for system change involved either increased resources or innovative activities that promoted and improved interaction between health care providers and patients. Feedback from health centre staff and management indicates that the facilitated, participatory approach for quality improvement and the system assessment tool are not only feasible and acceptable, but are highly valued in Aboriginal primary care settings.

Asthma care

Full title: **Systematic practice-based asthma care in the Australian setting**

Research type: Intervention

Status: Complete

Funder: NHMRC

Funding amount: \$563,000

Last year of funding: 2005

Project summary:

This study examine whether a systematic and comprehensive approach to asthma would lead to improved health outcomes for people with asthma. It was a practice based randomised controlled trial based in general practices in two States - South Australia and New South Wales. The intervention included:

- Assistance in setting up an asthma register to identify all patients with moderate to severe asthma;
- Assistance in implementing a recall system, including the use of postcard prompts ;
- Education of GPs about systematic asthma care and use of spirometry – through the provision of written information and offering a training workshop;
- Education of staff about their role in systematic asthma care and the claiming of the Asthma 3+ Visit Plan incentive ;
- Provision of a feedback process – a summary of key results from baseline data collection was sent to GPs.

Attitudes to lesbians

Full title: **Disclosure and attitudes to lesbians: Outcomes in General Practice (DIALOG)**

Research type: Descriptive

Status: Incomplete

Funder: NHMRC

Funding amount: \$426,000

Last year of funding: 2006

Project summary:

DIALOG was designed to develop an understanding of the patient-doctor relationship between same sex attracted women and their GP and studied whether disclosure of lesbian or bisexual sexuality within the consultation occurs and whether this affects the patient-doctor relationship and perceived quality of care. The study used qualitative methods, including interviews with same sex attracted women and with their usual GP and observed the practice environments of participating GPs. Key findings were that women varied in the extent to which they believed that disclosure to their GP was necessary and that GPs had



little awareness of same sex attracted women in their practice and access to very little professional development about lesbian and bisexual women's health issues. Many GPs felt poorly prepared and out of their depth. Developing cultural awareness for GPs appears to be important to assist in rapport building with this population group.

Application of the findings has been through conference presentations to GPs and lesbian/bisexual women. The findings have also influenced the RACGP new curriculum as the CI was the chair person of the women's health curriculum working group. A set of guidelines for GPs and same sex attracted women is being prepared.

Caring for carers

Full title: **Shared care in serious mental illness: caring for carers.**

Research type: Descriptive

Status: Complete

Funder: GPEP

Funding amount: \$93,000

Last year of funding: 2003

Project summary:

The project made use of the National Survey of Mental Health and Wellbeing 1997 data set and findings from interviews with carers to contrast the diagnosed mental and self-reported physical morbidities of carers of people with mental health problems with those experienced by people in the community. Limited comparisons were also possible between an innovative shared-care model ('CLIPP') and conventional area mental health service case management. The results provide a clear picture of the toll of caring for the chronically mentally ill. They illustrate high levels of mental illness found in carers as opposed to a matched population sample. Despite the high prevalence of mental disorders, few carers consulted GPs for mental health reasons, or felt the need to consult. These results suggest a 'stoic' model of response on the part of participating carers. We tentatively suggest, acknowledging limitations of the design for these comparisons, that AMHS carers may be more likely to have mental conditions than the CLIPP group (in this study 42% vs 23% $p=0.14$) and that CLIPP carers made significantly more use of GP services than did non-CLIPP carers for mental and physical health consultations, but not for mental health consultations alone.

Cognitive screening in GP

Full title: **Optimising Cognitive Screening in General Practice**

Research type: Intervention

Status: Complete

Funder: NHMRC

Funding amount: \$300,000

Last year of funding: 2005

Project summary:

The project was to develop a computer administered and scored (using voice recognition technology) memory test to use as a screening test for Alzheimer's. It was intended that the test could be administered in GP surgeries and that an essentially unlimited number of alternative forms be available. The test was completed and has been trialled in three different populations and formats. It appears to meet standard testing criteria and has the additional advantage of unlimited alternative forms and voice recognition scoring. Trials in GP surgeries have been promising but more trials are required. It is attracting interest as an experimental test for longitudinal research.

Doctors, patients and computers

Full title: **Doctors, their Patients and Computers: The New Medical Consultation- A study of the impact of computerisation**

Research type: Descriptive

Status: Incomplete

Funder: NHMRC

Funding amount: \$103,000

Last year of funding: 2006

Project summary:

This project was a social science study of the interaction between doctors, patients and computers in the computerised consultation. Methods included video observation of 124 consultations by 20 GPs. Using a dramaturgical methodology, the videos were analysed and the behaviours in several situations described.



Lateral epicondylalgia

Full title: **A randomised control trial of physiotherapy and corticosteroid injections of lateral epicondylalgia in primary care.**

Research type: Intervention

Status: Complete

Funder: NHMRC

Funding amount: \$193,000

Last year of funding: 2005

Project summary:

This was a randomised controlled trial to investigate the efficacy of physiotherapy compared with a wait and see approach or corticosteroid injections over 52 weeks in tennis elbow.

198 participants, with a clinical diagnosis of tennis elbow, received either eight sessions of physiotherapy, corticosteroid injections or wait and see.

Corticosteroid injection showed significantly better effects at six weeks but with high recurrence rates and significantly poorer outcomes in the long term compared with physiotherapy. Physiotherapy was superior to wait and see in the short term. At 52 weeks, most participants in both groups reported a successful outcome. The project concluded that

physiotherapy combining elbow manipulation and exercise has a superior benefit to wait and see in the first six weeks and to corticosteroid injections after six weeks and provides a reasonable alternative to injections in the mid to long term.

Learning from action

Full title: **Learning from Action**

Research type: Intervention

Status: Completed

Funder: CRCAH

Funding amount: \$244,214

Last year of funding: 2006

Project summary:

This project aimed to enhance understanding of the management challenges facing senior managers in Aboriginal community-controlled health services, and to deliver an action learning program to participants. It was conducted in partnership with the Queensland Aboriginal and Islander Health Council. The project worked with 13 senior managers in Queensland, using a series of 4 2-3 day workshops to explore current challenges facing each manager. They used structured records of those challenges as their data.

The main findings were that learning set method works well in this context, there is a need for more supportive infrastructure and systems for the Aboriginal PHC sector, and that while the manager's challenges are in many ways similar to those faced by mainstream health system managers, there are additional strengths as well as additional challenges for managers in this sector. Three of the participants in the Learning from Action project enrolled and were successful in getting postgraduate academic credit (equivalent to one subject in a Master of Health Administration).

The results of this project were used by OATSIH to inform its capacity development funding for the sector, including in the 2007/08 budget. The Queensland Aboriginal and Islander Health Council, with funding provided by OATSIH, has formed a partnership with Griffith University to deliver its Graduate Certificate in Health Service Management for managers within the community-controlled health sector in Queensland.

Literature summary service

Full title: **A rapid literature summary service to enhance evidence-based clinical decisions in general practice**

Research type: Intervention

Status: Complete

Funder: GPEP

Funding amount: \$109,000

Last year of funding: 2000

Project summary:

This project tested the feasibility of an evidence-based clinical literature search service to help answer general practitioners' clinical questions. GPs submitted questions and two search services supplied GPs with the best available empirical evidence to answer these questions. 58 GPs asked 160 questions. The GPs provided feedback on the value of the service, and concordance of answers from the two search services was assessed. The findings were that the service is feasible. Answering a question took a mean



of 3 hours 32 minutes of personnel time and evidence was available in 79% of questions. Conclusions reached by the two services were largely similar, with only minor differences for all questions. GPs fed back that they appreciated the service, and that asking the questions changed clinical care. The project concluded that the literature search service was feasible but further assessment is needed to establish its cost effectiveness.

Menopause

Full title: **The evidence-based consumer: making informed decisions about menopause, hormone replacement and complementary therapies.**

Research type: Intervention

Status: Complete

Funder: PHCRED

Funding amount: \$97,000

Last year of funding: 2004

Project summary:

Recent evidence about hormone therapy (HT) raised concerns about its safety, particularly for long-term use. Women report confusion and lack of reliable information to support independent decision-making at menopause. This project explored women's menopause educational needs through focus groups. It then identified an Australian resource meeting women's criteria – the Jean Hailes Foundation Multimedia Menopause Education Resources – and investigated the effectiveness of these resources through an RCT. Over 500 South Australian women aged between 40 and 64 participated. Women were free to choose resource media, any combination of web-based, print and seminar. Intervention group women improved in comparison with the Control group in decision-making confidence and knowledge about menopause itself, therapies and approaches to menopause and healthy ageing ($p < 0.001$). They also made statistically significant changes to their behaviour, including exercise and diet, and increased independent research and consulting health practitioners about menopause. These results have been disseminated to GPs, menopause specialists and women's health services, and have informed ongoing menopause resource development. They highlight the importance of health practitioners and menopause educators improving opportunities for women to access personally relevant menopause resources independently, by providing and referring women to evidence-based resources presented in media appropriate for differing skills and learning preferences.

Patient safety in GP

Full title: **Threats to patient safety in general practice: Investigating errors in Australian primary healthcare**

Research type: Intervention

Status: Complete

Funder: NHMRC

Funding amount: \$ 88,000

Last year of funding: 2005

Project summary:

The TAPS study explored the subject of reported threats to patient safety in general practice settings. It aimed to develop a suitable online reporting system for GPs, determine the types of error reported by GPs and further quantify reported error in general practice.

The TAPS study presented the first calculations known worldwide of the incidence of reported error in a general practice setting using a representative random sample of general practitioners. It was found that if an anonymous, secure, web-based reporting system was provided, the incidence of reported error per Medicare patient encounter item was 0.078% (95% CI 0.076% to 0.080%), and the incidence of reported error per patient seen per year was 0.240% (95% CI 0.235% to 0.245%). It found that the majority of reported patient safety events were errors related to the processes of health care (type 1), rather than errors related to the knowledge and skills of health professionals (type 2), at 69% and 31% respectively at the first level of the TAPS taxonomy. The web-based, secure and anonymous error reporting system was found to be suitable in terms of access and ease of use.

Prenatal screening

Full title: **A randomised controlled trial of a decision aid for prenatal screening and diagnosis**

Research type: Intervention

Status: Complete

Funder: NHMRC

Funding amount: \$269,000



Last year of funding: 2005

Project summary:

This study aimed to test whether a decision aid for prenatal testing of fetal abnormalities, when compared to a pamphlet, improves women's informed decision-making and decreases decisional conflict. A cluster designed randomised controlled trial was conducted in Victoria, Australia. Fifty General Practitioners (GPs) were randomised to one of two arms: providing women with either a decision aid or a pamphlet. Data were collected from women using questionnaires at 14 weeks and 24 weeks gestation. Women in the intervention group were significantly more likely to make an informed decision 76% (126/165) than women in the control group 65% (107/165). A greater proportion of women in the intervention group 88% (147/167) had a 'good' level of knowledge than women in the control group 72% (123/171). Decisional conflict scores were low in both groups, and there was no strong evidence of differences between the trial arms in the measures of psychological or acceptability outcomes. Therefore, this tailored prenatal testing decision aid assists pregnant women to make decisions about screening and diagnostic tests that are consistent with their values. We have made it available on the website of the MCRI and are seeking funding to increase availability of hard copies.

Screening for chlamydia

Full title: **Screening for Chlamydia trachomatis with routine Pap smears in general practice: A randomised controlled trial**

Research type: Intervention

Status: Complete

Funder: NHMRC

Funding amount: \$350,000

Last year of funding: 2006

Project summary:

The project conducted a pragmatic cluster-randomised controlled trial to determine whether asking general practitioners to offer chlamydia screening at the same time as Pap screening increases chlamydia screening in women in a primary care setting.

74 general practitioners from 34 general practices in the Australian Capital Territory participated. Doctors in the 17 intervention practices were asked to routinely offer the combined chlamydia/Pap screening in women aged 16-39; doctors in the control practices were asked to implement screening guidelines based on a risk assessment of the individual patient i.e. usual practice.

The main outcome measure was chlamydia screening rates per woman visit. The chlamydia screening rate per visit in intervention practices was 6.9% (95% CI 6.4-7.3) and 4.4% (95% CI 4.0-4.8) in control practices. After controlling for confounding factors they found a two fold greater odds of a chlamydia screening occurring during a visit by an eligible woman to the intervention practices than during visits by eligible women to control practices (Adjusted OR 2.1; 95% CI, 1.3-3.6). Implementation of this approach could represent an important public health innovation that would require little additional infrastructure support in settings where there is cervical screening.

Socioeconomic disadvantage

Full title: **Impact of socioeconomic disadvantage on chronic disease management in primary care: A diabetes case study**

Research type: Descriptive

Status: Complete

Funder: NHMRC

Funding amount: \$258,000

Last year of funding: 2006

Project summary:

The study was aimed at developing a reconceptualising of the social relationships involved in chronic illness care

Support for mothers

Full title: **Program of Resources, Information and Support for Mothers: a community randomised trial**

Research type: Intervention

Status: Complete

Funder: NHMRC

Funding amount: \$549,000

Last year of funding: 2001



Project summary:

PRISM was a cluster-randomised controlled trial (8 intervention and 8 comparison areas) to provide additional resources, information for mothers (and fathers), and support from GPs, Maternal and Child Health Nurses, local governments (LGA) and local communities in Victoria, following earlier studies of mothers' depression, and physical ill-health. Each intervention area had a dedicated community development officer and local steering committee for 2 years. The main findings were of no differences on any outcome measures between intervention and comparison communities though many intervention communities saw the overall findings as positive.

Treatment of low back pain

Full title: **Randomised Controlled Trial of Prolotherapy Injections, Saline Injections and Exercises in the Treatment of Chronic Low Back Pain**

Research type: Intervention

Status: Complete

Funder: GPEP

Funding amount: \$99,000

Last year of funding: 2003

Project summary:

The project conducted a randomised controlled trial to assess the efficacy of a prolotherapy injection and exercise protocol in the treatment of chronic non-specific low back pain.

110 participants with non-specific low back pain of average 14 years duration were randomised to have repeated prolotherapy (20% glucose/0.2% lignocaine) or normal saline injections into tender lumbopelvic ligaments and randomised to perform either flexion/extension exercises or normal activity over six months.

Ligament injections, with exercises and with normal activity, resulted in significant and sustained reductions in pain and disability throughout the trial, but no attributable effect was found for prolotherapy injections over saline injections or for exercises over normal activity. At 12 months, the proportions achieving >50% reduction in pain from baseline by treatment group were glucose-lignocaine, 0.46 vs saline, 0.36; and exercise, 0.41 vs normal activity, 0.39. Corresponding proportions for >50% reduction in disability were glucose-lignocaine, 0.42 vs saline, 0.34; and exercise, 0.36 vs normal activity, 0.38. There were no between group differences in any of the above measures.

The project concluded that in chronic non-specific low back pain, significant and sustained reductions in pain and disability occur with ligament injections, irrespective of the solution injected or the concurrent use of exercises.

Urban locational disadvantage

Full title: **Urban locational disadvantage and health: compositional and contextual determinants**

Research type: Descriptive

Status: Complete

Funder: NH&MRC/ PHCRED

Funding amount: \$608,000

Last year of funding: 2006

Project summary:

This four year project examined the ways that local neighbourhoods have an impact on the health of its residents, in particular through processes and outcomes of levels of social capital.

Four case studies were conducted in two low socioeconomic (SES) postcodes and two high SES postcodes. Residents within these areas were asked about their health and experiences of living in their neighbourhood through questionnaires (N=3453) and interviews (N=80), with a small number (N=16) also asked to take photographs of their areas. Community groups within each area were also surveyed (N=117) and a food basket survey was also undertaken.

A formal policy consultation process was undertaken with 4 workshops held with policy makers and practitioners from the state and local level, where preliminary research findings were presented and the implications discussed.

The study found that social capital, like health, was differentially distributed between postcodes and that overall the residents from the better off areas experienced higher levels of social capital and that there appeared to be an association between higher social capital and better self-reported health status. However one of the lower socio-economic areas scored higher than expected on some social capital measures and mental health and this has been attributed in part to social planning around 1990. Thus the study also provided a natural experiment of the effects of such planning.



Appendix 2: Sample summary

Table 1A Project methodology and target population

Methodology (number of projects)	Level of impact sought			
	Practitioners	General Practice	Organisational	Population
Descriptive (6)	SE Disadvantage, <i>Attitudes to Lesbians*</i> , <i>Drs Pts & Computers*</i> ,		Caring for carers,	Urban locational disadvantage,
Intervention (11)	Low back pain, Chlamydia, Prenatal screening, Literature summary, Lateral epicondylalgia,	Asthma, Cognitive screening,	Support for mothers, ABCD, <i>Learning from action*</i> ,	Menopause, Patient safety,

* Projects still in progress at time of survey.

Appendix 3: The questionnaire

Project Detail

1 Project title

2 Please provide a brief description of your research project, its methodology, main findings and how these have been applied.

3 Research Opportunities

3.1 Did you expect your research findings to lead to other research opportunities?

3.2 Did your research findings lead to other research opportunities?

3.3 Please describe what occurred and comment on how this came about.

4 Professional Development

4.1 Did you expect staff development, educational benefits or higher degrees to be earned as a result of your project?

4.2 Were there staff development, educational benefits or higher degrees earned as a result of your project?

4.3 Please describe what occurred and comment on how this came about.

5 State or Australian Government Policy Making

5.1 Did you intend your research findings to provide information relevant to State or Australian Government policy making?

5.2 Did your research findings provide information relevant to State or Australian Government policy making?

5.3 Please describe what occurred and comment on how this came about.

5.4 Did you intend your research findings to influence State or Australian Government policy making?

5.5 Did your the research findings influence State or Australian Government policy making?

5.6 Please describe what occurred and comment on how this came about.

6 Organisational, Local, Regional Level Decision Making

6.1 Did you intend your research findings to provide information relevant to organisational, local or regional level decision making?

6.2 Did your research findings provide information relevant to organisational, local or regional level decision making?

6.3 Please describe what occurred and comment on how this came about.

6.4 Did you intend your research to influence organisational, local or regional level decision making?

6.5 Did your research findings influence organisational, local or regional level decision making?

6.6 Please describe what occurred and comment on how this came about.

7 Education Curricula or Training Policies

7.1 Did you expect your research findings to influence education curricula or training policies?

7.2 Did your research findings influence education curricula or training policies?

7.3 Please describe what occurred and comment on how this came about.

7.4 Did you expect your research findings to be included in practice guidelines or in a systematic review?

7.5 Were your research findings included in practice guidelines or in a systematic review?

7.6 Please tell us which one (s).

8 Clinical Practice

8.1 Did you expect your research findings to be used in clinical practice?

8.2 Were your research findings used in clinical practice?

8.3 Please describe what occurred and comment on how this came about.

9 Service Delivery

9.1 Did you expect your research findings to lead to improvements in the process of service delivery?

9.2 Did your research findings lead to improvements in process of service delivery?

9.3 Please describe what occurred and comment on how this came about.

10 Service Improvement

10.1 Did you expect your research findings to lead to more equitable allocation of resources, better targeting of services or improved access to services?

10.2 Did your research findings lead to more equitable allocation of resources, better targeting of services or improved access to services?

10.3 Please describe what occurred and comment on how this came about.

11 Cost Reduction

11.1 Did you expect your research findings to lead to cost reduction in the delivery of existing services?

11.2 Did your research findings lead to cost reduction in the delivery of existing services?

11.3 Please describe what occurred and comment on how this came about.



12 Health Outcomes

- 12.1 Did you expect your research findings to lead to improved health outcomes for individuals or groups?
- 12.2 Did your research findings lead to improved health outcomes for individuals or groups?
- 12.3 Please describe what occurred and comment on how this came about.

13 Better Health at a Population Level

- 13.1 Did you expect your research findings to contribute to better health at a population level?
- 13.2 Did your research findings contribute to better health at a population level?
- 13.3 Please describe what occurred and comment on how this came about.

14 Intellectual Property Rights

- 14.1 Did you expect there to be any revenues gained from intellectual property rights?
- 14.2 Were there any revenues gained from intellectual property rights?
- 14.3 Please describe what occurred and comment on how this came about.

15 Product Development

- 15.1 Did you expect your research findings to inform product development?
- 15.2 Did your research findings inform product development?
- 15.3 Please describe what occurred and comment on how this came about.

16 Economic Benefits

- 16.1 Did you expect any other economic benefits?
- 16.2 Were there any other economic benefits?
- 16.3 Please describe what occurred and comment on how this came about.

17 Other Social, Environmental, Economic or Cultural Benefits

- 17.1 Did you expect your research findings to lead to any other social, environmental, economic or cultural benefits?
- 17.2 Were there any other social, environmental, economic or cultural benefits?
- 17.3 Please describe what occurred and comment on how this came about.

18 Research Transfer

- 18.1 Did you expect your project to lead to enhanced relationships for research transfer to potential users (eg. policy makers, organisational decision makers, practitioners and consumers)?
- 18.2 Did your project lead to enhanced relationships for research transfer to potential users (eg. policy makers, organisational decision makers, practitioners and consumers)?
- 18.3 Please describe what occurred and comment on how this came about.

19 University Engagement

- 19.1 Did you expect your research findings or processes to lead to improved university engagement with the community and the health care sector?
- 19.2 Did your research findings or processes lead to improved university engagement with the community and the health care sector?
- 19.3 Please describe what occurred and comment on how this came about.

20 Unfavourable Circumstances

- 20.1 Were there any circumstances which were not favourable for the use of your research findings?
- 20.2 Please describe what occurred and comment on how this came about.

21 Engagement with Potential Users

Did you involve potential users of your research in

- 21.1 clarifying project aims?
- 21.2 designing or refining methods?
- 21.3 interpretation of findings?
- 21.4 disseminating findings?
- 21.5 How successful was the involvement of your potential users in achieving use of your research findings?

22 Pathways to Use

- 22.1 How important were your professional networks in achieving use of your research findings?
- 22.2 A person of influence (possibly yourself) may be instrumental in bringing your research findings to a decision making forum. How important was the involvement of a person of influence in achieving use of your research findings?
- 22.3 How important were chance encounters or serendipitous events in achieving use of your research findings?
- 22.4 Were there any other activities, events, organisations or processes that facilitated the use of your research findings?
- 22.5 Please describe what occurred and comment on how this came about.

23 Peer Reviewed Publications

- 23.1 How many peer reviewed publications resulted from your project?
- 23.2 Please list peer reviewed publications from your project in this box.



23.3 To your knowledge have the peer reviewed publications been influential in achieving use of your research findings?

24 Conference Presentations

24.1 How many conference presentations were made by team members in order to raise awareness of your project, your methods or to disseminate your research findings?

24.2 Please list conference presentations in this box.

24.3 To your knowledge were these conference presentations influential in achieving use of your research findings?

25 Other Presentations

25.1 How many other presentations were made by team members to policy makers, practitioners and decision makers to raise awareness of your project, your methods or to disseminate your research findings?

25.2 To your knowledge were these presentations influential in achieving use of your research findings?

26 Media Releases

26.1 How many media releases were made about the project?

26.2 To your knowledge were these media releases influential in achieving use of your research findings?

27 Newsletter Articles

27.1 How many newsletter articles resulted from your project?

27.2 To your knowledge were these newsletter articles influential in achieving use of your research findings?

28 Other Media

28.1 How many media stories, appearances or interviews were there about your project?

28.2 To your knowledge were these media events influential in achieving use of your research findings?

29 Final Report

29.1 Was there a final report publicly available?

29.2 To your knowledge was your report influential in achieving use of your research findings?

30 Project Website

30.1 Was your project featured on a website/webpage?

30.2 To your knowledge was this website or webpage influential in achieving use of your research findings?

31 Publications or resources

31.1 Were there other publications or resources produced?

31.2 Please describe what was produced.

31.3 To your knowledge were these publications or resources influential in achieving use of your research findings?

32 Other Modes of Dissemination

32.1 Were there any other modes of dissemination that were important in achieving use of your research findings?

32.2 Please describe the other modes of dissemination.

32.3 To your knowledge were there other modes of dissemination influential in achieving use of your research findings?

Appendix 4: Impacts of research projects in relation to their intention

Modified Buxton and Hanney Payback Framework Categories	Research Transfer		Knowledge Production		Research capacity building			Informing policy and product development						Health and health sector benefits					Broader economic benefits									
	Enhanced university engagement with user groups	Enhanced relationships for research transfer	Number of peer reviewed publications	Number conference presentations	Further research opportunities	Number PhDs	Staff development	Provided information for policy making	Influenced policy making	Provided information for organisational decision making	Influenced organisational decision making	Was used in education	Informed product development	Was used in guideline development or systematic review	Used in clinical practice	Led to improvements in service delivery	Led to more equitable service delivery	Led to cost savings	Led to improved health outcomes	Intellectual property gains	Led to improvements in population health	Other economic impacts	Other social impacts	Number impacts expected	Number impacts achieved	% expectations fulfilled		
Project 1	●		4	16	●	1	●	●	●	●	●			●	●	●		●		●	○		14	13	93%			
Project 2	●		1	5	○	1	●	!	●	●	●			●	○			●		○		○	12	9	75%			
Project 3	●		4	7	○		●	●	○	●	●		●		!	○		○		○		●	13	9	69%			
Project 4	●	●	1	1	●		●	●	○	●	○	●		●	●	●		●		○	○	○	16	11	69%			
Project 5			5	30	●	1	●	○	○	●	●	○	●	●									9	6	67%			
Project 6	○		1	2	○		●	●	●	●	●			○									9	6	67%			
Project 7			2	5	○	1	●	●	○	●	!	○											6	4	67%			
Project 8	●	●	0	5	●		●	●	○	●	●	●			○	○				○		○	14	9	64%			
Project 9			0	0	●		●	○	○	●	●			●	●	○		●				○	11	7	64%			
Project 10	●	●	7	13	●	2	●	●	○	●	○				●	○				○			11	7	64%			
Project 11	○		7	16	●	1	●				●		●	●				○			○		8	5	63%			
Project 12	○		2	9	○	1	●	○	○		●			●	●			●	○				10	5	50%			
Project 13	●	●	1	7	●		●	●	●		●			○	○	○		○		○	○	○	14	7	50%			
Project 14		●	3	6	●	1	○	●	○	●	○			○	●					○		○	12	5	42%			
Project 15			0	0	●							●		○					○		○	○	6	2	33%			
Project 16	○	●	1	4	○	1	●		○	○	○	○						○		○			10	2	20%			
Project 17	○		0	5	●	1	●	○		○	○			○	○	○		○		○		○	12	2	17%			
No. Impacts expected	12	6			17		16	13	13	13	11	13	4	3	12	10	8	0	10	2	10	5	9	Legend: ○ Project was expected to have impact in this category ● Project was expected to have impact and achieved impact in this category ! Unexpected impact				
No. Impacts achieved	7	6			11		15	10	4	11	8	9	2	3	7	7	2	0	5	0	1	0	1					
% Impacts achieved	100	100			65		94	77	31	85	73	69	50	100	58	70	25		50	0	10	0	11					

Appendix 5: Comparison of results with other studies of research impact using the Payback Framework

	Categories used in this study	PHC RIS	NHMRC evaluation 2005 ²⁴	NHMRC Public Health Grants awarded in 1993 ²⁵	NICS 2003 Survey into the clinical application of research findings ²²	NHS Health Technology Programme 2007 ²⁶	North Thames NHS survey 1999 ⁸	Hong Kong ¹⁰
Comparability	Sample	Primary health care projects	Mixture of biomed/clinical/ population health and health services research	Public health grant (PHRDC) recipients awarded in 1993	NHMRC Biomedical projects (funded in 1994-2002)	Projects from the NHS Health Technology Assessment Program	Health service and mental health projects funded by North Thames NHS	Health and Health Services Research Fund projects.
	Methods	On line questionnaire	2003 sample: End of grant reports, 1997 sample: web based survey	Mail survey	Questionnaire	Questionnaire	Questionnaire	Questionnaire
	Sample size and response rate	17 Projects 29% response rate	131 projects completed in 2003 (29% response rate) 131 projects completed in 1997 (51% response rate)	38 Projects (69% response rate)	63 Projects (54% response rate)	133 Projects (65% response rate)	115 Projects (70% response rate)	187 Projects (87% response rate)
	Funding amount	Range \$88,000 – \$647,403 Mean \$299,801 Median \$258,000			\$17,000- 10 million. Median \$226,383.		Mean funding A\$77,751	Mean funding A\$52,487



	Categories used in this study	PHC RIS	NHMRC evaluation 2005 ²⁴	NHMRC Public Health Grants awarded in 1993 ²⁵	NICS 2003 Survey into the clinical application of research findings ²²	NHS Health Technology Programme 2007 ²⁶	North Thames NHS survey 1999 ⁸	Hong Kong ¹⁰
	Time since completion	6 years or less since completion. 3 projects still in progress			83% of projects were still in progress	3-11 years since initial funding	Assessment 2-5 years post completion	Assessment was a mean of 6.34 years post completion.
Research transfer	Enhanced university engagement with user groups.	41%						
	Enhanced relationships for research transfer.	35%						
Knowledge production	Number of peer reviewed publications.	76% 13 projects had journal articles Mean 2.29 Range (0-7)	Mean publications per grant: 1997 Biomed 7.0 (0-25) Clinical 5.2 (0-14) Pop H 4.6 (1-10) HSR 3.0 (1-3) 2003 Biomed 7.5 (0-54) Clinical 4.5 (0-20) Pop H 6.4 (1-16) HSR 4.3 (2-10)	78% had publications. (0-24 per project)	73% projects have resulted in publication in journals/books	Mean 1.98 per project excluding monographs	47% of projects resulted in journal articles	70.8% of projects had p/r publications Mean 2.1
	Number conference presentations.	88%			77%	55%		
	Other primary outputs –	Other presentations to					User presentations	Reports 15%



	Categories used in this study	PHC RIS	NHMRC evaluation 2005 ²⁴	NHMRC Public Health Grants awarded in 1993 ²⁵	NICS 2003 Survey into the clinical application of research findings ²²	NHS Health Technology Programme 2007 ²⁶	North Thames NHS survey 1999 ⁸	Hong Kong ¹⁰
	publications, presentations, websites, media.	users/practitioners 88% Report 64%				8% Presentations to practitioners 37%	Book chapters 10.5%	
Research targeting and capacity building	Further research opportunities	64%				46% received further funding	>66%	44.9%
	Number PhDs	58% of projects resulted in at least 1 PhD 11 PhDs Mean 0.64 (Includes still to be submitted PhDs. Other degrees not included)	Mean 1.3 (0-10) completions of PG degrees per grant	61% of projects had provided PG training. 25 PhDs 26 others at Masters level		21% projects lead to qualifications.	>25% projects 12 MD/MSc 12 PhD (Still to be submitted PhDs are not included)	38.2% projects resulted in PG degrees
	Staff development	88%						34.3%
Informing policy and product development	Provided information for policy making	58%			7% have findings which have been acted on by health service managers or policy makers.			
	Influenced policy making	23%	1997 sample 9%	58% Reported to have influenced PH policy. (Scope unstated)		73% (Includes NICE guidelines as policy making)	35.6%	



	Categories used in this study	PHC RIS	NHMRC evaluation 2005 ²⁴	NHMRC Public Health Grants awarded in 1993 ²⁵	NICS 2003 Survey into the clinical application of research findings ²²	NHS Health Technology Programme 2007 ²⁶	North Thames NHS survey 1999 ⁸	Hong Kong ¹⁰
	Provided information for organisational decision making	64%						
	Influenced organisational decision making	47%					37%	
	Was used in education	52%						
	Was used in guideline development or systematic review	17%			8%			35.4%
	Informed product development	11%						
Health and health sector benefits	Used in clinical practice	41%	1997 sample 24%	69%	19%	42%		42.1% had at least one impact in this domain
	Led to improvements in service delivery	41%						
	Led to more equitable	11%						



	Categories used in this study	PHC RIS	NHMRC evaluation 2005 ²⁴	NHMRC Public Health Grants awarded in 1993 ²⁵	NICS 2003 Survey into the clinical application of research findings ²²	NHS Health Technology Programme 2007 ²⁶	North Thames NHS survey 1999 ⁸	Hong Kong ¹⁰
	service delivery							
	Led to improved health outcomes	29%					32%	
	Intellectual property gains	0	1997 sample 20% of grants led to patents					
	Led to cost savings	0						
Broader economic benefits	Led to improvements in population health	5%						
	Economic impacts	0	1997 sample 41% of grants reported as having commercial potential					
	Other social impacts	5%						
Key findings								

Appendix 6: Journals in which articles from study sample were published, with impact factors

<i>Journal</i>	<i>Number of articles originating from study sample</i>	<i>Journal Impact Factor (from ISI Web of Science)</i>
British Medical Journal	2	9.245
Rheumatology	1	4.052
Journal of Epidemiology and Community Health	3	2.805
Social Science and Medicine	1	2.749
Medical Journal of Australia	4	2.582
Pain Medicine	1	2.447
British Journal of Sports Medicine	1	2.233
Spine	2	2.231
Archives of Physical Medicine and Rehabilitation	1	1.826
Biomed Central Public Health	3	1.60
Controlled Clinical Trials	1	1.333
Biomed Central Health Services Research	2	1.20
Australian and New Zealand Journal of Public Health	1	1.117
Australian Family Physician	2	
Australian Journal of Social Issues	1	
BJOG: An International Journal of Obstetrics and Gynaecology	1	
Chronic Illness	1	
Database of Abstracts of Reviews of Effects	1	
Evidence Based Medicine	1	
Environmental Health	1	
Gay and Lesbian Issues and Psychology Review	1	
Informatics in Primary Care	1	
Journal of Manual and Manipulative Therapy	1	
Quality and Safety in Health Care	1	
The Cochrane Library	2	
Urban Policy and Research	2	
TOTAL	39	