

COMMENTARIES

Embedding researchers in health service organizations improves research translation and health service performance: the Australian Hunter New England Population Health example

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In many health disciplines, epidemiological, clinical, and health service research rarely influences health policy or practice [1–3]. A primary impediment to the translation of health and medical research findings into either health service improvements or community benefit is the poor alignment between the focus of research and the knowledge needs of policy makers and practitioners [4]. In developing health policy or practice, policy makers and practitioners need to identify effective interventions that could feasibly be delivered in the context and resources of their community [4,5]. Policy makers and practitioners also require information regarding the effectiveness of strategies to best implement evidence-based interventions or health policies at scale [4,6]. However, intervention trials, particularly those assessing the impact of implementation strategies, represent a considerable challenge for researchers, are expensive, and require close collaboration with end-user organizations [6]. It is perhaps unsurprising then that trials testing the impact of health interventions or implementation strategies represent 11% and 2% of research output, respectively [7,8].

Research coproduction, involving an active partnership between researchers and end users in all stages of the research process, is an increasingly recommended strategy to address the gap between the focus of research and the needs of policy makers and practitioners [9]. Although this approach represents a significant departure

from conventional models of scientific enquiry, evidence suggests that it may have a greater impact on health and medical outcomes and the development of health policy and practice [10–14]. For example, a positive association has been reported between end-user engagement in research and subsequent improvement in organizational performance, clinical outcomes for patients, and in the development of relevant and effective health policies [15–18].

A number of large initiatives to foster research-practice partnerships and facilitate research translation have been established. In England, the National Institute for Health Research funded nine Collaborations for Leadership in Applied Health Research and Care (CLAHRC) in 2008. CLAHRCs sought to develop partnerships between universities and local health service organizations to improve patient health outcomes through applied health research, supporting research translation, and increasing health service use of research [19]. CLAHRCs improved research informed practice and the capacity of academics and health services to engage in research coproduction [19]. In the United States, the Department of Veteran Affairs Quality Enhancement Research Initiative (QUERI) [20], implemented in 1998, involved a number of new organizational structures, roles, and procedures to support collaboration and coproduction between researchers and practitioners. QUERI is credited with numerous significant improvements in patient care and health system performance and has made significant scientific contributions in the fields of health services research [20].

Notwithstanding the merits and success of these single large initiatives, research-practice partnerships remain elusive across health systems and particularly in epidemiology and public health services where engagement of

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Key findings

- Embedding researchers in health service organization can optimize research coproduction through greater knowledge exchange and alignment of research with health policy and practice needs.

What this adds to what is known?

- An embedded coproduction approach makes policy and practice-relevant research immediately available to end users, accelerating the use of evidence in decision making of health and other services.
- A coproduction approach provides opportunities to leverage academic and health services resources to achieve scientific and service delivery objectives.

What are the implications and what should change now?

- End-user organizations should seek to embed staff with academic expertise in senior leadership positions.

practitioner and policy end users by researchers has been reported to often be “tokenistic,” even when such partnerships are incentivized with funding support [20]. A number of examples of successful models of research-practice partnerships have, however, emerged across the U.K., Canada, Australia, and the Netherlands [21]. Although theoretical and conceptual models to guide such partnerships exist [22], description of real-world examples is needed to provide practical evidence to inform future efforts by policy makers, practitioners, and researchers.

In this paper, we describe a successful research-practice partnership between a population health service delivery unit in Australia (Hunter New England Population Health) and the University of Newcastle, Australia, a partnership that involves the embedding of researchers in a health service organization.

1. The Hunter New England Population Health research-practice partnership

Hunter New England Population Health (HNEPH) and the University of Newcastle have operated as an integrated research-practice partnership for more than 12 years. HNEPH is a government-funded population health unit providing communicable and noncommunicable disease prevention services to approximately 900,000 residents of the geographically diverse Hunter New England region of New South Wales, Australia. Since its inception in 2005, HNEPH has partnered with the School of Medicine and Public Health at the University of Newcastle to codesign

and deliver evidence-based population health services to the community and to conduct population health service delivery-focused research.

The conduct of research and service delivery by the partnership is founded on the embedding of researchers in the service delivery unit. University of Newcastle research staff members are colocated with HNEPH service delivery staff in HNEPH service delivery facilities. A single-integrated governance structure oversees both service delivery and research initiatives. Senior leadership positions are filled by staff holding both health service and university appointments. The service delivery and research initiatives of HNEPH are staffed by both HNEPH practitioners and university researchers. Senior researchers hold service delivery management roles, and senior health service managers lead research initiatives.

Both research and service delivery initiatives are coconceived, codesigned, coevaluated, and codisseminated by researchers and practitioners. The research initiatives align with and address HNEPH service delivery or related policy needs, gaps, or challenges and are conducted in the context of the delivery of services to the local or NSW communities. This integrated approach to research and practice offers significant opportunities to advance epidemiological and health science, as well as service delivery outcomes through (1) supporting service innovation and improvement, and accelerating translation of research findings; (2) leveraging resources to achieve scientific and service delivery objectives; and (3) supporting knowledge exchange and building the capacity of both researchers and practitioners.

1.1. Supporting service innovation and improvement and accelerating research translation

HNEPH service delivery is planned and undertaken in a manner that enables innovation, continuous service improvement, and immediate use of research findings. Achieving health service innovation and improvement through research requires development of interventions that are compatible with end-user needs and contexts, and the use of evaluation methods that do not unduly interrupt service provision but preserve internal and external validities. A number of examples of how this has been achieved by the partnership through the coproduction of intervention and implementation research are described in Table 1.

1.1.1. Trials assessing intervention effectiveness in addressing chronic disease risks

In instances where effective interventions suitable for large-scale rollout are unavailable in the published literature, HNEPH resources are used to develop and/or trial interventions to establish effectiveness in the local context before investment in large-scale dissemination and implementation is considered. For example, to reduce surgical risk and improve long-term health, the elective surgery unit

Table 1. Selected trials and translation outcomes of interventions coproduced by HNEPH and The University of Newcastle

Trial objectives and partners	Key study considerations	Research findings	Translation outcomes
<p>Pragmatic efficacy or effectiveness trials</p> <p>Aim: To assess, the efficacy of an intervention in improving smoking cessation of patients attending preoperative clinics for elective surgery preparation [23–26].</p> <p>Intervention: Tailored computer-based cessation counseling, nicotine replacement therapy, brief clinician advice, referral to Quitline.</p> <p>Partners: Newcastle University; HNEPH; surgical preoperative services.</p> <p>Design and setting: RCT in outpatient clinics.</p>	<p>i) The use of RCT to maximize internal validity.</p> <p>ii) Delivery of intervention by clinicians in the context of usual clinical responsibilities and with all patients not contraindicated to improve external validity.</p> <p>iii) The use of a computer program to deliver some intervention components and prompt care provision by clinic staff was designed to address staff time, skill, and forgetfulness barriers to care provision and facilitate adoption by preoperative service if effective.</p>	<p>Relative to a usual care control, there was a significant improvement in preoperative and postoperative smoking cessation among patients in the intervention group.</p>	<p>Intervention adopted as routine care for tobacco users by the surgical preoperative service and informed clinical practice guidelines.</p> <p>A fax-based system of referring patients to a Quitline tested as part of the trial was adopted for use across hospitals in the state.</p>
<p>Aim: To examine the effectiveness of an intervention in reducing risky alcohol consumption and harm among community football club members [2].</p> <p>Intervention: Sporting clubs supported to implement alcohol management practices consistent with liquor licensing requirements.</p> <p>Partners: Newcastle University; HNEPH; Deakin University; Australian Drug Foundation.</p> <p>Design and setting: RCT in community sports clubs.</p>	<p>i) The use of RCT to maximize internal validity.</p> <p>ii) Selection of sports clubs across football codes, geographic, and socioeconomic localities to improve external validity.</p> <p>iii) The model of supporting clubs to deliver the intervention was considered suitable by the Australian Drug Foundation to be used as routine service delivery if effective.</p>	<p>Relative to an information only control, there were significant reductions in excessive alcohol use among member of intervention clubs.</p>	<p>Intervention was rolled out across Australia by the Alcohol and Drug Foundation.</p>
<p>Aim: To assess the efficacy of a telephone-based intervention for parents to increase the fruit and vegetable consumption in their 3- to 5-y-old children [27–29].</p> <p>Intervention: Printed resources with four 30-min scripted behavioral counseling telephone support calls delivered by call center staff.</p> <p>Partners: Newcastle University; HNEPH.</p> <p>Design and setting: RCT in home settings.</p>	<p>i) The use of RCT to maximize internal validity.</p> <p>ii) All parents who were not contraindicated were eligible for intervention to improve external validity.</p> <p>iii) Intervention was designed to be consistent with telephone support services models (e.g., Quitline) existing at the time, that is, brief and not reliant on specialist qualifications and skills (e.g., dieticians) of call staff.</p>	<p>Relative to an information only control, there were significant improvements in fruit and vegetable intake of parents and children in the intervention group.</p>	<p>The intervention was included in the state health plan as a state-wide service for parents.</p>
<p>Dissemination and implementation trials</p> <p>Aim: To assess the impact of an intervention on the provision of smoking cessation care to nicotine-dependent smokers by clinicians across a network of hospitals [30].</p>	<p>i) Comparative controlled design was not possible as nicotine dependence treatment was required to be implemented concurrently to all 37 hospitals at the point of introduction of a state-wide smoke-free policy.</p>	<p>The provision of smoking cessation care increased significantly six of the seven measures of clinician care provision between the baseline and follow-up periods, respectively.</p>	<p>The intervention improved care smoking cessation care provision across the entire HNE hospital system.</p> <p>The implementation model has been used by HNEPH and the Local Health District to implement other district-</p>

(Continued)

Table 1. Continued

Trial objectives and partners	Key study considerations	Research findings	Translation outcomes
<p>Intervention: A multicomponent intervention was implemented over a 2-y period in all 37 public general hospitals and included clinician training, endorsement by the Chief Executive of the health district, telephone implementation support calls from HNEPH staff, care protocols, and performance monitoring and feedback.</p> <p>Partners: Newcastle University; HNEPH, Hunter New England Local Health District.</p>	<ul style="list-style-type: none"> ii) Patient medical records provided a continuous source of data enabling the use of a time series design to strengthen internal validity. iii) All general hospitals included in the study to strengthen external validity. iv) Care provision protocols were integrating into existing clinical practice pathways and data recording systems to minimize clinical disruption. 		<p>wide preventive health initiatives.</p>
<p>Design and setting: Interrupted time series in a single health district in New South Wales.</p> <p>Aim: To examine the effectiveness of a multistrategy intervention in increasing the implementation of vegetable and fruit breaks by all (>400) primary schools in the Hunter New England (HNE) region.</p> <p>Intervention: The implementation strategy included consensus processes; leadership from school executive; staff training; program materials; implementation incentives; follow-up implementation support delivered by HNEPH staff and performance feedback [31].</p> <p>Partners: Newcastle University; HNEPH, Hunter New England Local Health District.</p>	<ul style="list-style-type: none"> i) All schools were required to receive implementation support concurrently over 12 months precluding the opportunity for randomized designs with no intervention or waitlist controls. ii) Lack of routine data collection precluded time series designs. iii) The use of schools outside the intervention region as a comparison included to strengthen internal validity. iv) All nonspecialist schools included to strengthen external validity. v) Implementation support strategies were identified as a suitable model to implement other school-based initiatives by HNEPH if effective. 	<p>Relative to control, the prevalence of vegetable and fruit breaks increased significantly in intervention schools.</p>	<p>The model of implementation was used by the department of health to implement obesity prevention programs in schools across the state.</p>
<p>Design and setting: Quasiexperimental. All schools in HNE region receive implementation support. A random selection of schools in the rest of the state served as controls.</p> <p>Aim: To determine the effectiveness of an intervention in facilitating police recording of the alcohol consumption characteristics of people involved in assaults across the entire state of New South Wales (NSW) to improve targeted policing [32].</p>	<ul style="list-style-type: none"> i) All police jurisdictions were required to implement the data recording system. A stepped wedge design enabled all sites to receive implementation support was consistent with time-tabled rollout and was selected to strengthen internal validity. 	<p>The intervention was effective in enhancing the recording of alcohol-related information for assault incidents.</p>	<p>The model of implementation support improved recording to facilitate targeted policing of alcohol-related harm across NSW and was used to similarly improve recording of alcohol use of people involved in assaults in other jurisdictions internationally.</p>

(Continued)

Table 1. Continued

Trial objectives and partners	Key study considerations	Research findings	Translation outcomes
<p>Intervention: The implementation strategy included implementation support by the Police Commissioner, modification to standard operating procedures, training of police officers, performance feedback, and communication and implementation support staff.</p> <p>Partners: Newcastle University; HNEPH, NSW Police.</p> <p>Design and setting: Stepped wedge trial was conducted across police jurisdiction of the state of New South Wales, Australia.</p> <p>Aim: To determine the effectiveness of an intervention to close the gap in aboriginal infant immunization coverage in New South Wales (NSW) [33].</p> <p>Intervention: Aboriginal immunization officers were used to contact the families of aboriginal children by telephone before their due immunization date (precall) to provide the rationale for timely immunization, and to facilitate contact with culturally safe local immunization services if this was required.</p> <p>Partners: Newcastle University; HNEPH, Aboriginal Controlled Community Health Services,</p> <p>Design and setting: Before –after and stepped wedge trial across NSW.</p>	<p>ii) All police jurisdictions receive support maximizing external validity.</p> <p>iii) The model of implementation support used existing infrastructure and processes of NSW Police.</p> <p>Three study periods with the initial phase demonstrating significant gap between aboriginal and nonindigenous infant immunization rates both in HNE and rest of NSW.</p> <p>During the second phase, HNE employed aboriginal immunization officers to precall mothers.</p> <p>In the third phase, on the basis of the success in HNE, aboriginal immunization officers were employed across NSW, but the precall strategy was only fully implemented in HNE.</p>	<p>There was a significant decrease in the immunization coverage gap between aboriginal children and nonindigenous children in HNELHD ($P < 0.0001$) and the rest of NSW where only aboriginal immunization officers were employed, but no precall strategy implemented ($P = 0.004$).</p>	<p>The employment of aboriginal immunization officers was associated with closing of the gap between aboriginal and nonindigenous infants' immunization coverage in HNELHD and NSW. The precall telephone strategy provided accelerated benefit in closing this gap in HNELHD.</p>

Abbreviation: RCT, randomized controlled trial; HNEPH, Hunter New England Population Health.

of a major tertiary hospital sought assistance from HNEPH to develop and test a preoperative smoking cessation intervention for elective surgery patients. An intervention was codeveloped to deliver preoperative smoking cessation care consistent with contemporary scientific evidence and clinical practice guideline [34]. The intervention addressed key barriers to the provision of such care that were reported by clinic staff and was integrated into existing clinic processes [23,24]. On the basis of positive findings of a randomized controlled trial [23,24], the intervention was adopted into routine surgical management of tobacco users [25], with the hospital referral pathway adopted by hospitals across the state and cited in international practice

guidelines. Successful investment in service delivery innovation and rigorous evaluation thereof by the partnership has similarly occurred in other settings including hospitals [26], schools [35], sporting clubs [36], and licensed venues [37], with each innovation being directly translated into routine service delivery practice and/or government policy (Table 1).

1.1.2. Trials of strategies to improve implementation of evidence-based health interventions

Given a focus of the partnership on improvement in the delivery, at scale, of evidence-based services to the community, development and evaluation of strategies to enhance

implementation of proven interventions are a focus of research initiatives. Such research has often required the use of nonconventional research designs. For example, when support to implement policy or evidence-based programs cannot feasibly be provided to all sites or providers across the region simultaneously, research designs using a delayed or waitlist comparison group including stepped wedged (multiple baseline designs) or serial randomized controlled trial designs are used. Such designs maximize internal validity while remaining consistent with the required large-scale “rollout” of service delivery initiatives and address the ethical imperative of equitable access to health services [38]. For example, serial randomized trials have been used to evaluate an implementation strategy to support primary schools implement an evidence-based government policy to remove unhealthy foods from regular sale at schools canteens [39,40]. As it was not feasible to provide policy implementation support to all schools simultaneously and as the effectiveness of the implementation support strategies in achieving policy compliance was unknown, subgroups of schools were randomly assigned to receive implementation support or serve as a waitlist

control each year [39–43]. Annual randomized evaluation enabled refinement and optimization of the implementation support being provided to schools and resulted in ongoing improvements in the cost-effectiveness of the HNEPH service in achieving population-wide policy implementation (Fig. 1).

1.2. Leveraging resources to achieve scientific and service delivery objectives

The HNEPH research-practice partnership provides opportunities to leverage the intellectual and financial resources of both parties to simultaneously achieve scientific and service delivery objectives. The contribution of scientific expertise by the University of Newcastle staff ensures the application of evidence to the development, evaluation, and dissemination of HNEPH services to the community. The health service provides researchers with access to practice-relevant research questions and inputs to ensure that interventions and evaluation processes are contextually. The considerable resources of the health service also enable research to be conducted that is not reliant

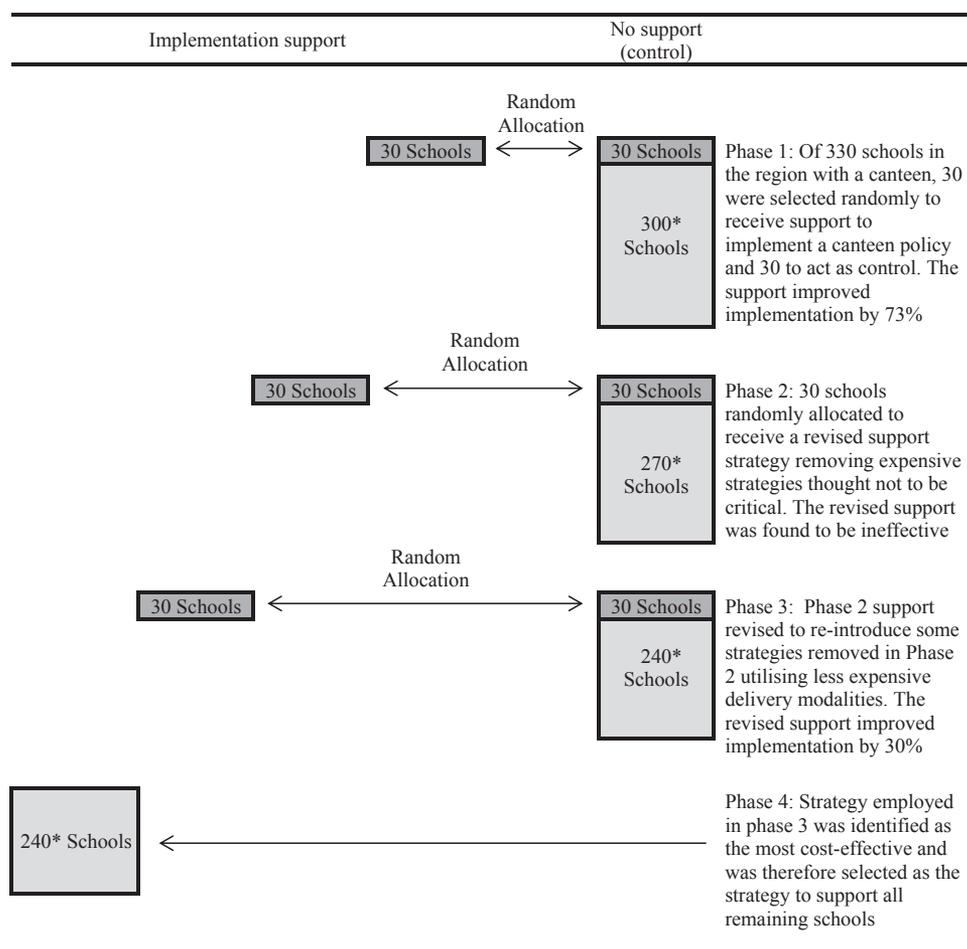


Fig. 1. Serial randomized trial design used to assess the impact of strategies to improve implementation of a health school canteen policy. *Sample sizes provided represent approximates.

on external research grant success or constrained by their conditions or limited funding periods. Furthermore, the combined HNEPH University infrastructure is used to leverage institutional research resources (e.g., PhD scholarships and pilot grants) and competitive grant income totaling on average \$4 million per annum. For researchers, this infrastructure provides a fertile ground for scientific enquiry and research output with the partnership publishing a peer-reviewed research article on average each week, almost half of which in journals ranked in the top 20% for their field. Over 60% of published work has described translation stage 3 (“T3”) research (dissemination and implementation), and 40% has described the outcomes of trials.

1.3. Knowledge exchange and building the capacity of researchers and practitioners

The HNEPH research-practice partnership supports knowledge exchange and builds the capacity of both researchers and practitioners by exposing researchers to the values, needs, and operating environment of service delivery organizations and by exposing practitioners to the use and service delivery benefits of evidence in policy and practice decision making. An outcome of this approach is a motivated learning workforce of both researchers and service providers that embrace new evidence and exhibit a willingness and ability to adopt new methods, approaches, and paradigms to both research and practice.

In addition to facilitating the achievement of such outcomes through the coproduction of both research and service delivery initiatives, research capacity building activities implemented by the partnership primarily involve the provision of PhD and postdoctoral research training opportunities. Currently, the partnership provides supervision for eight externally funded research fellowships and >15 PhD candidates, all conducting applied public health intervention research and receiving supervision and mentoring from both senior academics and senior policy makers or practitioners. The provision of research training opportunities has specifically targeted existing health service (HNEPH) staff, with 8 of 15 health service managers having completed or are currently enrolled in a PhD program, increasing from just two staff with PhD qualifications in 2005.

2. Factors that enhance the effectiveness of research-practice partnerships

The experience of the HNEPH research-practice partnership and the reported findings of other examples [19–21] suggest that a number of factors contribute to the conduct of practice-relevant research and the translation of research findings into service delivery and community benefit:

1. Similar to that found in evaluations of QUERI [20], the embedding of researchers into HNEPH service delivery teams and organizational governance positions and processes and of HNEPH staff in research teams is considered a critical feature in the achievement of enhanced research and service delivery performance. This strategy maximizes bidirectional knowledge transfer and exchange and enables immediate translation of research into practice. Few research-practice partnerships have involved such integration. Having senior leadership positions, including that of Director, with dual university and health service appointments enables the accountabilities of each organization to be met in a synergistic manner.
2. Successful research-practice partnerships require co-contribution of resources if the partnerships are to endure. In the case of CLAHRCs [21], the requirement of cofunding (at least 50%) of research activities by research partners was considered an important component of the success of the scheme. Similarly, financial and in-kind contributions are made by both parties in the HNEPH partnership (commensurate with their priorities) demonstrated commitment to the partnership and the value of its outcomes.
3. Research-practice partnerships must produce cobenefits if they are to be successful. For the HNEPH service delivery partner, the partnership has yielded improvements in health system performance, demonstrated through exceeding service delivery performance indicators and the receipt of national awards for innovation and excellence in service delivery. The partnership has also fostered one of the more highly performing research groups at the university attracting \$40m in grant income since 2005, publications in prestigious journals, research awards, demonstrable research translation impact, and research higher degree completions.
4. Evidence clearly suggests that the benefits of research-engaged health services accrue over time [18]. Time is also required to achieve research translation on a systematic and continuing, not one-off, basis. More concretely, in the case of the HNEPH partnership, time (more than a decade) has been an essential ingredient for the development of an integrated team of service delivery-focused research staff and research-focused practitioners, a development achieved through the time consuming training of partnership-based PhD and postdoctoral researchers.

3. Conclusion

Increasing the impact of health and medical research represents a considerable challenge to governments, universities, and health services. The research-practice

partnership between Hunter New England Population Health and the University of Newcastle has been successful in conducting rigorous public health-focused research that has yielded changes in health policy, practice, and outcomes locally, nationally, and internationally and has made significant contributions to advancing population health science and knowledge broadly. Central to the success of the partnership has been the embedding of researchers in the health service organizational facilities, processes, and structures resulting in an integration of research and service delivery initiatives. Further description and evaluation of the impact of such models are required, particularly in the area of public health and epidemiology research and service delivery.

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