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Innovations

Knowledge Translation and Interprofessional Collaboration: Where the Rubber of Evidence-Based Care Hits the Road of Teamwork

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Abstract

Knowledge-translation interventions and interprofessional education and collaboration interventions all aim at improving health care processes and outcomes. Knowledge-translation interventions attempt to increase evidence-based practice by a single professional group and thus may fail to take into account barriers from difficulties in interprofessional relations. Interprofessional education and collaboration interventions aim to improve interprofessional relations, which may in turn facilitate the work of knowledge translation and thus evidence-based practice. We summarize systematic review work on the effects of interventions for interprofessional education and collaboration. The current evidence base contains mainly descriptive studies of these interventions. Knowledge is limited regarding the impact on care and outcomes and the extent to which the interventions increase the practice of evidence-based care. Rigorous multimethod research studies are needed to develop and strengthen the current evidence base in this field.

We describe a Health Canada-funded randomized trial in which quantitative and qualitative data will be gathered in 20 general internal medicine units located at 5 Toronto, Ontario, teaching hospitals. The project examines the impact of interprofessional education and collaboration interventions on interprofessional relationships, health care processes (including evidence-based practice), and patient outcomes. Routes are suggested by which interprofessional education and collaboration interventions might affect knowledge translation and evidence-based practice.

Keywords: Interprofessional education, interprofessional collaboration, randomized controlled trials, multimethod evaluation, knowledge translation, evidence-based care, continuing education

Introduction

The notion that clinical decisions should be based upon reliable evidence from randomized trials and systematic reviews has become commonplace. The need to close the gap between the evidence-based ideal diagnostic or treatment choice and the actual practice of real-world professionals has produced a new area of inquiry, known as *implementation research*[1] or *knowledge translation research.*[2,3] One of the main questions addressed by this field of inquiry is, What are the barriers that prevent practitioners from using evidence-based choices, and how can these barriers be overcome and practice changed?[4]

This field of inquiry has almost uniformly been focused on the practice of individual practitioners or clusters of such practitioners from a single profession. Few of the studies in this field

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have examined the way in which the multidisciplinary organization of health care delivery affects the spread of evidence-based practice, and even fewer studies report attempts to improve evidence-based practice of multidisciplinary groups, such as primary care practices or staff on wards. This is not surprising. Although long known to be idealized,[5] the prevailing practice of health care assumes that each profession has its well-defined area of hegemony and that boundaries between these roles are clear and communication and collaboration across them is successful. The focus of interventions to improve evidence-based practices has thus been almost exclusively within professions, as evidenced by the titles of journals such as *Evidenc-Based Nursing* or *Evidence-Based Medicine.* The idea that the spread of evidence-based practices might be hindered by the interactions between professions has recently been raised by Ferlie et al.[6] in case studies of diffusion of innovation within multiprofessional organizations, such as hospitals and primary care practices. They conclude that within these larger organizational structures, there exist separate uniprofessional communities of practitioners each of which communicates and changes internally, but diffusion across the boundaries between these professional communities is generally hindered by their lack of shared work experience and their different belief systems on the value of different kinds of evidence. One of the studied cases stands out. For the use of aspirin in primary care, widespread diffusion occurred rapidly, seemingly facilitated by all professions and based upon a common view of the evidence and a shared approach to care. This case appears to have been writ large in another study (36 nursing homes and 1,645 residents) where high quality of physician-nurse communication was closely and positively correlated with excellence in evidence-based prescribing at that home.[7] This suggests that interprofessional collaboration is associated with diffusion of evidence-based practice. While neither study uses a methodology that can demonstrate causal direction, it has been suggested elsewhere that the cause is interprofessional collaboration, with evidence-based practice the result.[8]

An increasing empirical literature (not explicitly related to the evidence-based-practice movement) agrees with this point of view, suggesting that failures of collaboration and communication between professionals have a profound negative effect on health care and health outcomes, undermining the validity of clinical decisions, and interrupting or creating errors in the implementation of these decisions.[9,10] Explanations for poor interprofessional relationships include the lack of explicit, appropriate task and role definitions; the absence of clear leadership; insufficient time for team building; the "us-and-them" effects of professional socialization; frustration created by power and status differentials; and the vertical management structures for each profession.[11-14]

As this evidence of error and quality problems accumulates, it is accompanied by a growing belief among policymakers that interprofessional relationships are important and must be improved. For reasons that remain unclear, policymakers are choosing to intervene in this relationship using one of two generic approaches. The more medically oriented policymakers are taking a path of quality and safety improvement in which care processes are systematically analyzed to identify error and failure, and these processes are revised by workplace-based, multiprofessional groups.[15] On the other hand, the more nursing-oriented policymakers are focusing explicitly on interprofessional education or more rarely on collaboration and proposing interventions in these areas.[16] Neither the quality and safety groups, nor the interprofessional education and collaboration groups are explicitly focused on questions of evidence-based practice, the former relying on guidelines (that may or may not be evidence-based) and the latter focusing on the relationship between professions, rather than the evidence content of the

choices made. (We note with admiration the work of the quality and safety movement and have discussed elsewhere the limited way in which it has taken relations between professions into account.[17] We will not discuss this here because our intention is to focus on interprofessional relations and evidence-based practice, rather than any specific error that may result from the poverty of these relationships).

Policymakers who focus on poor interprofessional relations have aimed their proposed interventions at the educational system where prelicensure students are undergoing their initial professional training. A prevailing belief is that early exposure to other professions through interprofessional education will later produce better collaboration, which in turn will produce better and safer patient care and improved outcomes.[18] However, evidence for this chain of causality and thus for the effectiveness of interprofessional education and collaboration interventions remains elusive.

In this article, we review the literature on strategies to improve interprofessional communication and collaboration, both through prelicensure interprofessional education and postlicensure interprofessional collaboration interventions, to identify the evidence for impact on objectively measurable health care processes or patient outcomes. We also describe plans for a rigorous research study examining the impact of an interprofessional education and collaboration intervention, funded recently in a wave of Canadian projects by the federal government. In doing so, our overall intention is to open a discussion on knowledge translation and evidence-based practice and its possible dependency on good interprofessional communication and collaboration, taking place as it does in complex multidisciplinary environments.

Evidence of Effectiveness

As noted above, to begin to examine the evidence base for interprofessional education and collaboration, we searched the literature in two ways: first, to identify published reviews of studies of the effects of interprofessional education and interprofessional collaboration; and second, to identify more recently published work, we conducted a systematic review of primary studies of these two types of intervention. Given the entwined nature of interprofessional education and collaboration activities, we used the following definitions:

- Interprofessional education was defined as "an activity involving two or more health or social care professions engaged in learning with, from, and about each other."
- Interprofessional collaboration was defined as "an active relationship between two or more health or social care professions who work together to solve problems or provide services."[19]

To add further conceptual clarify to our definitions, we categorized interprofessional education and interprofessional collaboration according to its "stage" (i.e., when it is delivered) and its purpose (Table 1).

To ensure we were clear about what types of outcomes we were searching for in relation to these activities, we defined *effectiveness* as the impact of an intervention on an objectively measurable health care process or on a health outcome, and we used a simple vote counting outcome in which each study was deemed to have a result that was positive (effective, with statistically significant and clinically important positive primary outcome), negative (harmful), or indeterminate (no evidence that the impact is either effective or harmful or not statistically or clinically important).

To identify relevant published systematic reviews of interprofessional education and collaboration interventions, we searched a number of databases (MEDLINE, the Cochrane Database of Systematic Reviews, and the Database of Abstracts of Reviews of Effects). To update the

Table 1 Categorising interprofessional education and collaboration

Purpose	Stage	
	Pre-licensure	**Post-licensure**
Learning	Interprofessional education involving students	Interprofessional education involving qualified practitioners
Working	Interprofessional education involving students on practice placements	Interprofessional collaboration involving practitioners

findings contained in published reviews, we also searched the primary literature from 2001 to 2003. We searched the Cochrane Central Register of Controlled Trials (CENTRAL), a register of randomized controlled trials, and the Cochrane Effective Practice and Organization of Care (EPOC) literature database. Our search used combinations of key words, including *interprofessional, interdisciplinary, interoccupation, multiprofessional, multidisciplinary, multioccupation,* and *multi-institution.* We also drew on our own databases of literature and contacted a number of leading researchers in the field for references.

Based on this approach, we identified, examined, and summarized 8 preexisting systematic reviews. Of these, 1 reported on the effectiveness of prelicensure interprofessional education,[20] 3 reported on the effectiveness of interprofessional education before and after licensure,[21-23] and 4 reported on the effectiveness of interprofessional collaboration interventions.[24-27] Collectively, this work assessed evidence of effectiveness for interprofessional education and collaboration interventions from 1955 to 2001. However, because most of these reviews employed wide inclusion criteria of methodology and outcomes, it is difficult to judge the effectiveness (as we defined above) of both types of intervention. Two of the reviews[22,25] were undertaken within the parameters of a Cochrane Review and therefore employed stricter inclusion criteria (only evidence derived from controlled before and after, interrupted time series or randomized studies, and only outcomes linked to objective measures on professional practice or patient care). Of these 2 reviews, 1 found no interprofessional education studies that met these criteria[22] and the other found only 2 studies of interprofessional collaboration interventions qualified for inclusion, although neither of these studies explicitly stated improving interprofessional relations as their goal.[25]

In terms of findings from our review of more recent primary studies, we initially retrieved 419 studies from our CENTRAL search. We reviewed the electronic abstracts and agreed that 26 were relevant. The EPOC search results were requested, and we retrieved 31 studies. None of these, however, were deemed relevant for inclusion after review. Among the 26 provisionally included studies, a full assessment of each excluded a further 12, as they either contained no intervention related to interprofessional collaboration, had no control group, reported no results, contained confounding interventions, or were duplicate studies. Of the 14 studies, all were interprofessional collaboration interventions. Nine studies showed positive results, and 5 studies reported indeterminate (no change) outcomes related to their intervention (Table 2).

Table 2 Interprofessional collaboration intervention studies

Clinical context	Study	Outcome
Geriatric evaluation and management	Boult C, Boult L, Morishita L, Dowd B, Kane R, Urdangarin C. A randomized clinical trial of outpatient geriatric evaluation and management. *J Am Geriatrics Society* 2001; 49:351-359.	Positive
	Saltvedt I, Mo E, Fayers P, Kaasa S, Sletvold O. Reduced mortality in treating acutely sick, frail older patients in a geriatric evaluation and management unit. A prospective randomized trial. *J Am Geriatrics Society* 2002; 50:792-798.	Positive
Emergency room care for abused women	Campbell J, Coben J, McLoughlin E, Dearwater S, Nah G, Glass N et al. An evaluation of a system-change training model to improve emergency department response to battered women. *Academic Emergency Med* 2001; 8:131-138.	Positive
Sexually Transmitted Infections	Shafer M, Tebb K, Pantell R, Wibbelsman C, Neuhaus J, Tipton A et al. Effect of a clinical practice improvement intervention on Chlamydia screening among adolescent girls. *JAMA* 2002; 288:2846-2852.	Positive
Adult immunisation	Siriwardena A, Rashid A, Johnson M, Dewey M. Cluster randomized controlled trial of an educational outreach visit to improve influenza and pneumococcal immunization rates in primary care. *Brit J General Practice* 2002; 52:735-740.	Positive
Fractured hips	Naglie G, Tansey C, Kirkland J, Ogilvie-Harris D, Detsky A, Etchells E et al. Interdisciplinary inpatient care for elderly people with hip fracture: a randomized controlled trial. *CMAJ* 2002; 167:25-32.	Positive
Neonatal intensive unit care	Rogowski J, Horbar J, Plsek P, Baker L, Deterding J, Edwards W et al. Economic implications of neonatal intensive care unit collaborative quality improvement. *Pediatrics* 2001;107:23-29.	Positive
Depression care	Solberg L, Fischer L, Wei F, Rush W, Conboy K, Davis T et al. A CQI intervention to change the care of depression: a controlled study. *Effective Clinical Practice* 2001; 4:239-249.	Positive
	Rost K, Nutting P, Smith J, Werner J, Duan N. Improving depression outcomes in community primary care practice: a randomized trial of the quEST intervention. Quality Enhancement by Strategic Teaming. *J Gen Int Med* 2001; 16:143-149.	No change
Simplifying medications	Muir A, Sanders L, Wilkinson W, Schmader K. Reducing medication regimen complexity: a controlled trial. *J Gen Int Med* 2001; 16:77-82.	Positive
	Grymonpre R, Williamson D, Montgomery P. Impact of a pharmaceutical care model for non-institutionalized elderly: results of a randomized, controlled trial. *International J Pharmacy Prac* 2001; 9:235-241.	No change
Congestive heart failure	Kasper E, Gerstenblith G, Hefter G, Van Anden E, Brinker J, Thiemann D et al. A randomized trial of the efficacy of multidisciplinary care in heart failure out-patients at high risk of hospital readmission. *J Am College Cardiology* 2002; 39:471-480.	No change
Stroke care	Evans A, Perez I, Harraf F, Melbourn A, Steadman J, Donaldson N & Kalra L. Can differences in management processes explain different outcomes between stroke unit and stroke-team care? *Lancet* 2001; 358(9293):1586–1592.	No change
Care of elderly patients with pneumonia	Naughton B, Mylotte J, Ramadan F, Karuza J & Priore R. Antibiotic use, hospital admissions, and mortality before and after implementing guidelines for nursing home-acquired pneumonia, *J Am Geriatrics Society* 2001; 49:1020-1024.	No change

In regards to our findings on the evidence bases for interprofessional education and collaboration, as noted above, we could not find reliable studies on the effectiveness of interprofessional education. This absence of evidence does not, however, mean that interprofessional education is ineffective; it may simply mean that it is difficult to evaluate in a rigorous fashion. In contrast, the evidence for interprofessional collaboration interventions is less scant and suggests a positive impact on health care processes and outcomes. Nevertheless, because these studies are a heterogeneous group, a formal meta-analysis to establish their overall impact is not possible. (See Zwarenstein et al.[28] for a more detailed account of this work.)

Developing the Evidence Base

As previously discussed, there is a lack of rigorous evidence in relation to both interprofessional education and interprofessional collaboration. In this section, we describe a Health Canada-funded research project that aims to gather both quantitative and qualitative data within 20 general internal medicine (GIM) units based in 4 Toronto teaching hospitals. We describe this project to help understand how such rigorous research studies, aimed at beginning to address the current shortfalls in the evidence bases for interprofessional education and collaboration, can be implemented across a number of clinical settings.

This study will employ a pragmatic–cluster, randomized controlled trial (RCT) design (with control groups receiving delayed intervention) to evaluate the impact an interprofessional education and collaborative intervention on the clinical practice of staff working in these GIMs and on the care they deliver. The GIM units who have agreed to participate in this study typically consist of a team of attending physicians, postgraduate physicians, resident trainees, and clerks who work with a matching group of senior and junior nurses. This GIM unit team will include all other health professionals (i.e., therapists, social workers, home care coordinators, pharmacists) who are providing services in that unit. To reduce "contamination," allocation of wards will be conducted under restricted conditions, in which a unit sharing a team of nurses will be allocated as a pair, either to the intervention or control group, for that hospital. Where possible, other health professionals will also be allocated to the intervention and control groups.

We expect approximately 12 months of evaluation, with some 30,000 patient admissions and stays during this time, half in our intervention units and half in the comparison units. We will collect administrative data that are already processed and available related to admissions and stays. In addition, we aim to collect data to capture insights in a number of areas, including

- Patient-related outcomes connected to patient centeredness of care, patient and family knowledge and satisfaction, readmission rates, and evidence-based discharge prescriptions
- System performance relating to length of stay, staff turnover, and waiting times in GIM admission wards
- Interprofessional satisfaction and trust among nurses, physicians, and allied professionals

While our use of an RCT design is aimed at producing rigorous insights into the effects of this interprofessional collaboration intervention, one needs to remember that these experimental designs produce a "black box effect."[29] In essence, this is a term employed when research accounts present data on both the "inputs" and "outputs" of a specific intervention but have little or no data regarding the processes that connect these 2 points. An effective approach in opening the black box is to use qualitative methods, primarily observations and interviews. By employing such methods, one can begin to

understand *why* an intervention produced a certain type of outcome. To ensure that this project does not produce a black box effect, ethnographic observations and interviews will be undertaken to gather rich data from the GIM teams where the trial will be implemented.

Concluding Comments

Our reviews of the interprofessional education and collaboration literature presented above suggest that while no rigorous evidence for interprofessional education currently exists, there might be some benefit to interventions that address interprofessional collaboration. However, there is little indication on what the mechanisms for this benefit might be. Indeed, the mechanisms by which improved interprofessional collaboration may facilitate evidence-based care have not, to our knowledge, been studied or discussed. Our hypothesis is that there are 3 potential mechanisms, none of which are mutually exclusive:

- Good interprofessional collaboration will allow one profession to effectively report to another about aspects of patients' condition that need intervention but that may, under less collaborative circumstances, be ignored or not heard. This in turn allows for the decision-making professional to take note and act, hopefully by taking evidence-based decisions.
- If the evidence base is common to several professions and all are aware of it, absence of an evidence-based decision by one professional may be detected and intercepted by a member of another profession. If interprofessional collaboration is poor and relations are conflictual and hierarchical, it will not be possible for a professional to comment on this. Thus, good interprofessional collaboration may allow for the reporting and correction of such gaps.
- More reliable implementation of all decisions. A possible consequence of better communication and collaboration will, of course, increase the probability that an evidence-based decision is actually carried out. While this does not in and of itself

Lessons for Practice

- There is very little rigorous research that considers knowledge translation, continuing education, or research utilization in the interprofessional context.
- The complex interprofessional nature of almost all health care delivery means that interventions aimed at one professional group will have an impact on the work of other professional groups and will be affected by their relations with the target profession and their response to the proposed intervention.
- When developing knowledge-translation interventions and continuing education programs, the design should accommodate the needs of the many professions in the health care workplace.
- Consider whether it is possible to conduct the activity in multiprofessional groups—that is, as interprofessional education.
- Implementation of changes in the practice of one profession seldom occur without accommodation or active engagement by other professions and so create a workplace-based interprofessional collaboration activity around the tasks that will be affected.

selectively favor evidence-based decisions over other decisions, it may do so in relation to practices for which continuing education programs or knowledge-translation interventions had raised awareness.

Error trapping, more sensitive and broader patient assessments, and high-reliability implementation of decisions are just 3 mechanisms by which improved interprofessional collaboration may give knowledge translation and evidence-based care more traction in the health care workplace.

What lies ahead? In research terms, we need to understand better the ways in which the application of evidence-based practices is dependent on interprofessional education and interprofessional collaboration in order to identify related barriers and to explore interventions to overcome such barriers. Second, interventions in interprofessional education and collaboration should be evaluated also using outcomes that more sensitively measure evidence-based care.

Over time, there have been many fads in health care quality improvement and safety. Those that look likely to be more than merely fads are interprofessional education, interprofessional collaboration, knowledge translation, and evidence-based practice and the exciting interplay between them.

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