Interprofessional collaboration: effects of practice-based interventions on professional practice and healthcare outcomes (Review)

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[Intervention Review]

Interprofessional collaboration: effects of practice-based interventions on professional practice and healthcare outcomes

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ABSTRACT

Background

Poor interprofessional collaboration (IPC) can negatively affect the delivery of health services and patient care. Interventions that address IPC problems have the potential to improve professional practice and healthcare outcomes.

Objectives

To assess the impact of practice-based interventions designed to change IPC, compared to no intervention or to an alternate intervention, on one or more of the following primary outcomes: patient satisfaction and/or the effectiveness and efficiency of the health care provided. Secondary outcomes include the degree of IPC achieved.

Search strategy

We searched the Cochrane Effective Practice and Organisation of Care Group Specialised Register (2000-2007), MEDLINE (1950-2007) and CINAHL (1982-2007). We also handsearched the Journal of Interprofessional Care (1999 to 2007) and reference lists of the five included studies.

Selection criteria

Randomised controlled trials of practice-based IPC interventions that reported changes in objectively-measured or self-reported (by use of a validated instrument) patient/client outcomes and/or health status outcomes and/or healthcare process outcomes and/or measures of IPC.

Data collection and analysis

At least two of the three reviewers independently assessed the eligibility of each potentially relevant study. One author extracted data from and assessed risk of bias of included studies, consulting with the other authors when necessary. A meta-analysis of study outcomes was not possible given the small number of included studies and their heterogeneity in relation to clinical settings, interventions and outcome measures. Consequently, we summarised the study data and presented the results in a narrative format.

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Main results

Five studies met the inclusion criteria; two studies examined interprofessional rounds, two studies examined interprofessional meetings, and one study examined externally facilitated interprofessional audit. One study on daily interdisciplinary rounds in inpatient medical wards at an acute care hospital showed a positive impact on length of stay and total charges, but another study on daily interdisciplinary rounds in a community hospital telemetry ward found no impact on length of stay. Monthly multidisciplinary team meetings improved prescribing of psychotropic drugs in nursing homes. Videoconferencing compared to audioconferencing multidisciplinary case conferences showed mixed results; there was a decreased number of case conferences per patient and shorter length of treatment, but no differences in occasions of service or the length of the conference. There was also no difference between the groups in the number of communications between health professionals recorded in the notes. Multidisciplinary meetings with an external facilitator, who used strategies to encourage collaborative working, was associated with increased audit activity and reported improvements to care.

Authors' conclusions

In this updated review, we found five studies (four new studies) that met the inclusion criteria. The review suggests that practice-based IPC interventions can improve healthcare processes and outcomes, but due to the limitations in terms of the small number of studies, sample sizes, problems with conceptualising and measuring collaboration, and heterogeneity of interventions and settings, it is difficult to draw generalisable inferences about the key elements of IPC and its effectiveness. More rigorous, cluster randomised studies with an explicit focus on IPC and its measurement, are needed to provide better evidence of the impact of practice-based IPC interventions on professional practice and healthcare outcomes. These studies should include qualitative methods to provide insight into how the interventions affect collaboration and how improved collaboration contributes to changes in outcomes.

PLAIN LANGUAGE SUMMARY

Interprofessional collaboration: effects of practice-based interventions on professional practice and healthcare outcomes

The extent to which different healthcare professionals work well together can affect the quality of the health care that they provide. If there are problems in how healthcare professionals communicate and interact with each other, then problems in patient care can occur. Interprofessional collaboration (IPC) practice-based interventions are strategies put into place in healthcare settings to improve work interactions and processes between two or more types of healthcare professionals.

In this review, we found five studies that evaluated the effects of practice-based IPC interventions, categorised as interprofessional rounds, interprofessional meetings, and externally facilitated interprofessional audit. Three of these studies found that these interventions led to improvements in patient care, such as drug use, length of hospital stay and total hospital charges. One study showed no impact, and one study showed mixed outcomes.

The studies indicate that practice-based IPC interventions can lead to positive changes in health care, but further studies are needed to have a better understanding of the range of possible interventions and their effectiveness, how they affect interprofessional collaboration and lead to changes in health care, and in what circumstances these interventions may be most useful.

BACKGROUND

Description of the condition or problem

Interprofessional collaboration (IPC) is the process in which different professional groups work together to positively impact health care. IPC involves a negotiated agreement between professionals which values the expertise and contributions that various healthcare professionals bring to patient care. IPC also involves issues that arise due to different professionals working together, such as problematic power dynamics, poor communication patterns, lack of understanding of one's own and others' roles and responsibilities, and conflicts due to varied approaches to patient care (Delva 2008; Kvarnstrom 2008; Miller 2008; Sheehan 2007; Suter 2009). Research has documented that problems with IPC can have adverse effects on health care. For example, a study on interprofessional teams in Sweden found that healthcare professionals identified problems with IPC as having a negative impact on patient care and service (Kvarnstrom 2008). Studies in the U.S. and

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Canada have documented the impact of communication problems on work processes and patient safety in surgery (Lingard 2004; Williams 2007). In a U.S. sentinel event alert of infant death and injury during delivery, issues in communication were identified as a root cause in 72 percent of the 47 cases identified, and more than half of the organisations cited organisational culture as a barrier to effective communication and teamwork (The Joint Commission 2004).

Research in the area of IPC is complicated by the use of varied terms such as collaboration, communication, coordination, and teamwork, as well as the overlap of the field with other fields of study which also examine how health care is organised and delivered. For example, shared care has been defined as "the joint participation of primary care physicians and specialty care physicians in the planned delivery of care, informed by an enhanced information exchange over and above routine discharge and referral notices" (Smith 2007). This definition of shared care emphasises the relationship between different types of physicians and does not have an interprofessional focus. Oxman 2008 found more than 40 distinct definitions of care coordination in a systematic review, yet all shared five key elements. These key elements included: the involvement of numerous participants in care coordination, the necessity of coordination, the importance of participants having knowledge of one's own and others' roles, and the importance of information exchange. IPC could be positioned within this broader literature on care coordination, but the explicit focus on 'interprofessional' enables an examination of pertinent issues through this lens and targets potential intervention approaches.

Description of the intervention

An IPC intervention is an intervention that involves members of more than one health and/or social care profession *interacting* together with the explicit purpose of improving interprofessional collaboration. In a current scoping review of the interprofessional field, three types of interprofessional interventions have been delineated: interprofessional education, interprofessional practice, and interprofessional organisation interventions (Goldman 2009). This review focuses on interprofessional practice (IPP) interventions, also called practice-based IPC intervention. An IPP intervention involves the deployment in the workplace of a tool or routine to improve IPC; examples include communication tools, interprofessional meetings, and checklists. A review focusing solely on interprofessional education (IPE) interventions was recently updated (Reeves 2008). A review of interprofessional organisation (IPO) interventions aimed at improving IPC should be the focus of a future review. An IPO intervention involves a change at the organisation level to improve interprofessional collaboration; examples include policy and staffing changes.

This current review, the updated IPE review, and a third protocol on case management (Zwarenstein 2000a), make up three Cochrane companion reviews on the effects of complex interprofessional interventions. An IPE intervention occurs when members of more than one health and/or social care profession *learn interactively* together, for the explicit purpose of improving interprofessional collaboration and/or the health/well-being of patients/clients. Interactive learning requires active learner participation, and active exchange between learners from different professions (Reeves 2008). Case Management is an intervention aimed at improving coordination of care through creating coordination as a specific task which is delegated out from the main care provider(s).

How the intervention might work

A practice-based IPC intervention might work through the incorporation of a tool or routine into practice that supports the type of interaction (e.g. communication, coordination) amongst different healthcare professionals that is thought to be necessary to improve a particular area of health care.

Why it is important to do this review

Research documenting problems in IPC and the effects on health care and patient outcomes is accumulating, and thus it is important to understand the effectiveness of interventions aimed at improving IPC and health care. Governments around the world are instituting major changes and investing significant resources to improve collaboration amongst healthcare professionals. Ideally, these policy decisions should be based on evidence of the effectiveness of these approaches, as such interventions can involve significant resources. The aim of this review is to synthesise the evidence of RCTs on practice-based IPC interventions to inform such decision making. This review is an update to a review on nurse-physician collaboration (Zwarenstein 2000), and with the rising interest in this issue, it is timely to both update the review and also to revise it to include all healthcare professionals.

OBJECTIVES

To assess the impact of practice-based interventions designed to change IPC, compared to no intervention or to an alternate intervention, on any one or more of the following outcomes: patient satisfaction and/or the effectiveness and efficiency of the health care provided and/or the degree of IPC achieved.

METHODS

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Criteria for considering studies for this review

Types of studies

The original Cochrane review (Zwarenstein 2000) on IPC included both randomised controlled trials (RCTs) and controlled before and after (CBA) designs, and in this review we have included only RCTs. We decided to take a more restrictive approach in order to focus on studies which would provide the most rigorous evidence for the effects of practice-based IPC.

Types of participants

The original Cochrane review (Zwarenstein 2000) focused on collaboration between nurses and physicians. In this updated review, we have expanded the focus to include studies which aim to improve collaboration between any types of health and social care professionals (e.g. chiropodists/podiatrists, complementary therapists, dentists, dietitians, doctors/physicians, hygienists, midwives, nurses, occupational therapists, pharmacists, physiotherapists, psychologists, psychotherapists, radiographers, social workers, and speech therapists). We widened the scope of this review to recognise the contributions of the varied professionals and their potentially important roles in collaborative health care. This broader approach is reflective of the ongoing developments in research, practice, and policy in this field (Glasby 2008).

Types of interventions

A practice-based intervention introduced to a practice setting with an explicit objective of improving collaboration between two or more health and/or social care professionals.

Types of outcome measures

Primary outcomes of interest: objectively measured or self-reported (validated instrument) patient/client health measures (such as mortality, disease incidence, duration, or cure rates), quality of life measures and complication rates; and/or healthcare process outcomes, such as readmission rates, adherence rates, continuity of care, use of resources (i.e.. cost-benefit analyses) and/or patient or family satisfaction.

Secondary outcome of interest: objectively measured or self reported (validated instrument) measures of IPC.

Search methods for identification of studies

For the original review, we searched *The Cochrane Library* (CDSR, CCTR and DARE), the EPOC register (and the register of studies awaiting assessment) (see SPECIALISED REGISTER under GROUP DETAILS), and MEDLINE up to November 1999. The MEDLINE search can be found in Appendix 1.

For this update, we modified the search strategy from the previous IPC Cochrane review to include all types of health and social care professionals and only RCTs. We adapted the modified search strategy for the MEDLINE and CINAHL databases. We searched each database up to September 2007. The searches covered the following periods:

MEDLINE, 1950 to September week 3 2007

CINAHL, 1982 to September week 3 2007

The MEDLINE search strategy used was:

1 exp Interprofessional Relations/ and (collaborat$ or team$).tw. (5155)
2 exp Patient Care Team/ and (collaborat$ or team$).tw. (12351)
3 ((interprofession$ or inter-profession$) adj (collaborat$ or team$)).tw. (182)
4 ((interdisciplin$ or inter-disciplin$) adj (collaborat$ or team$)).tw. (1786)
5 ((interoccupation$ or inter-occupation$) adj (collaborat$ or team$)).tw. (0)
6 ((multiprofession$ or multi-profession$) adj (collaborat$ or team$)).tw. (199)
7 ((multidisciplin$ or multi-disciplin$) adj (collaborat$ or team$)).tw. (4316)
8 ((multioccupation$ or multi-occupation$) adj (collaborat$ or team$)).tw. (0)
9 ((transdisciplin$ or trans-disciplin$) adj (collaborat$ or team$)).tw. (39)
10 (team$ adj collaborat$).tw. (69)
11 or/1-10 (19533)
12 randomized controlled trial.pt. (243004)
13 controlled clinical trial.pt. (76266)
14 randomized controlled trials/ (51095)
15 random allocation/ (59118)
16 double blind method/ (93566)
17 single blind method/ (11368)
18 or/12-17 (411697)
19 animals/ not humans/ (3184360)
20 18 not 19 (386092)
21 11 and 20 (518)

The CINAHL search strategy is available in Appendix 2.

In addition, we searched the Effective Practice and Organisation of Care Group (EPOC) Specialised Register (see Specialised Register under Group Details), for articles added to the register 2000-2007, up to 16 August 2007 (see Appendix 3).

We placed no language restrictions on the search strategy.

The search generated a total of 1128 abstracts (421 from EPOC, 510 from MEDLINE, 197 from CINAHL).

Searching other resources

We also handsearched the Journal of Interprofessional Care (1999 to 2007) and reviewed reference lists of the included studies.

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Data collection and analysis

Selection of studies

At least two of the three authors independently reviewed each of the 1128 abstracts retrieved in the searches to identify all those which contained all of the following criteria.

1. A practice-based IPC intervention occurred (the study explicitly noted an objective to improve collaboration amongst two or more types of healthcare professionals; other terms besides collaboration might have been used, such as communication, coordination, and teamwork).
2. Interprofessional practice, care process, patient health or patient or family satisfaction outcomes were reported.
3. The intervention was evaluated using a RCT design.

We identified 77 studies from this abstract search as potentially meeting these criteria (17 from EPOC, 44 from MEDLINE, 16 from CINAHL). We obtained the full text of all articles selected by any one reviewer. At least two of the three authors independently assessed each full text article to further examine whether it met all of the criteria. We resolved failure to reach consensus through consultation with the third author. The third author reviewed all included articles as a further quality check for inclusion in the review.

Data extraction and management

We extracted the following information from included studies:

1. study setting (country, healthcare setting);
2. types of study participants;
3. description of collaborative intervention;
4. description of any other interventions;
5. main outcome measures;
6. results for the main outcome measures;
7. any additional information that potentially affected the results.

We used the quality criteria recommended by EPOC to assess risk of bias of all studies included in the review (EPOC Review Group Checklist, 2002).

We used the following criteria to assess risk of bias of RCTs:

1. concealment of allocation;
2. follow up of professionals;
3. follow up of patients or episodes of care;
4. blinded assessment of primary outcomes(s);
5. baseline measurement;
6. reliable primary outcome measure(s);
7. protection against contamination.

We assigned an overall quality rating (high, moderate, low protection against bias) to each study. We gave a high quality rating if all criteria were rated as done (or not applicable); we gave a moderate quality rating if one or two criteria were not done or unclear; and we gave a low quality rating for studies if three or more criteria were not done or unclear. One author assessed the risk of bias of included studies.

Data synthesis

Ideally we would have conducted a meta-analysis of study outcomes for this review. This, however, was not possible due to the small number of included studies and the differences in relation to methodological design and outcome measures across the studies. Consequently, we have presented the results in a narrative format.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.

In the original review published in 2000 (Zwarenstein 2000), we included two studies. For this update, we have excluded the Jitapunkul 1995 study because it was not an RCT, but retained Curley 1998 in the review. Following the updated searching, four additional studies met the inclusion criteria for a total of five studies. One of these, Schmidt 1998, which was discussed in the first review but not included as a study, was included in this review due to changing the criteria from nurse-physician collaboration to include interventions aimed at changing any healthcare professional collaboration. We identified two additional randomised IPC studies (Crotty 2004; Jones 1999). However, we excluded these studies because the former did not have objective outcome measurements, and the latter did not have an explicit focus on collaboration.

Four studies compared an intervention to a control group which received no intervention, while the fifth study compared two types of interprofessional interventions. We have categorised the studies into three main types of interprofessional practice-based interventions: interprofessional rounds, interprofessional meetings, and externally facilitated interprofessional audit. While the studies utilise different terminology (e.g. interdisciplinary rounds or multidisciplinary audit), the sub-titles reflect the interprofessional field and the objective of developing consistent terminology. We have used the terminology used in the studies in the presentation of results.

All of the studies met the first type of outcome measure criteria of an objectively measured or self-reported (validated instrument) patient/client or healthcare process outcome. While the secondary outcome, interprofessional collaboration, was evaluated in some of the studies, there were limitations with the methods used, and thus we have reported results from only one study.

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Interprofessional rounds

As reported in the original review, Curley 1998 examined the effects of daily interdisciplinary rounds in inpatient medical wards at an acute care hospital in the United States. The intervention group consisted of three ward services that implemented interdisciplinary work rounds and was compared to the control group, consisting of three other ward services that continued traditional work rounds. Team members included interns and residents in medicine, staff nurses, nursing supervisors, respirologists, pharmacists, nutritionists, and social workers. To reduce baseline variability, this hospital (the original 'firm' trial hospital) had a process of random allocation to wards for patients (n = 535 control and 567 intervention) and staff. Patient data were collected from the hospital's administrative and billing system to examine length of stay and hospital charges. Aerosol use appropriateness was studied to determine the achievement of respiratory therapy recommendations. The study lasted for six months.

Wild 2004 studied the effects of daily interdisciplinary rounds in a telemetry unit of a community hospital in the United States. In this study, 42 patients were randomised to a medical team that performed daily interdisciplinary rounds, and 42 patients were randomised to a medical team that provided routine care. In the interdisciplinary rounds, the resident physicians, nurses, a case manager, pharmacist, dietitian, and physical therapist spent 2-5 minutes discussing each patient and identifying and addressing possible discharge problems. The rounds lasted 30-45 minutes. Data on length of stay were abstracted from medical charts. No information on the duration of the intervention was provided.

Interprofessional meetings

Schmidt 1998 evaluated the impact of multidisciplinary team meetings on the quality and quantity of psychotropic drug prescribing in Swedish nursing homes. In 15 experimental nursing homes, a pharmacist helped organise team meetings that occurred approximately once a month over a period of 12 months. The pharmacist attended two training sessions prior to, and three sessions during, the program. The participants in the meeting included a physician, a pharmacist, and selected nurses and nursing assistants. All participants were encouraged to participate in the meeting discussions about the drug use of individual residents. Normal routines to influence drug prescribing occurred in the control homes. Nursing home residents' prescriptions were recorded one month before and one month after the 12-month intervention.

Wilson 2004 compared multidisciplinary audioconferencing and multidisciplinary videoconferencing with a team that worked at two hospitals 16 km apart in Australia. Participating team members consisted of medical staff specialists, medical registrars, nurses, a speech pathologist, occupational therapists, a social worker, and medical students. Patients were randomly assigned to the audioconferencing or videoconferencing group (50 patients in each group). There were 38 conference sessions which incorporated 263 individual patient discussions by the team. The mean number of team members at the two sites was three and 5.4 over the duration of the study. At each conference session, the audioconferences were conducted before the videoconferences with the same multidisciplinary team. The following measures were examined: the number of conferences per patient, average length of conference, length of treatment, and number of occasions of service (nursing and allied health) and recording of communication with other allied health disciplines for each patient episode of care.

Externally facilitated interprofessional audit

Cheater 2005 was an evaluation of an externally facilitated program aimed at improving multidisciplinary audit in secondary care. Twenty-two multidisciplinary teams from five acute care hospitals in the United Kingdom participated. There were 11 teams with 77 participants in the intervention group and 11 teams with 64 participants in the control group. Each team consisted of nurses and physicians, as well as a representative from one or more of the following groups: professionals allied to medicine (e.g. pharmacist, social worker, physiotherapist), service support staff (e.g. ward clerk, care assistant) and managers. A range of specialties (e.g. surgery, medicine, accident and emergency, nephrology, respiratory medicine, obstetrics and gynecology) was represented. After participating in a two-day skills workshop, external facilitators facilitated five meetings for each of the multidisciplinary teams randomised to intervention, over a period of six months. Intervention teams were required to undertake an audit and submit a report. Control teams were also asked to undertake an audit and had access to the usual level of audit support available at their institution. Quality of audit was reported.

Risk of bias in included studies

Of the five studies, we have rated one study as 'high quality' (Schmidt 1998) and four studies as 'moderate quality' (Cheater 2005; Curley 1998; Wild 2004; Wilson 2004) (see Risk of bias in included studies tables).

Effects of interventions

This section reports on the primary and secondary outcomes of interest in this review.

Interprofessional rounds

Primary outcomes

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The Curley 1998 study found differences for length of stay and costs for patients in the interdisciplinary group compared to the traditional care group. The mean length of stay for the patients in the interdisciplinary rounds group was 5.46 days, compared with 6.06 days for traditional care (P = 0.006) group and the mean total charges were $6,681 and $8,090 (P = 0.002) for the two groups, respectively. Regarding respiratory therapy, 91.7% of the orders for administration of aerosols in the interdisciplinary rounds group were appropriate, compared with 73.6% for the traditional rounds group (P = 0.075).
Wild 2004 found no difference in length of hospital stay between the experimental group (3.2 ± 2.7 days) which participated in interdisciplinary rounds and the control group (3.2 ± 3.2 days) (P = 0.90).

Interprofessional meetings

Primary outcomes

In the Schmidt 1998 study, results showed that after 12 months of team meetings in the experimental homes, the average number of drugs prescribed in the experimental homes was the same before and after the intervention (2.07% before intervention and 2.08% after intervention), the average number of drugs increased by 7% in the control homes (2.06% before intervention to 2.20% after intervention, P = 0.02). The use of nonrecommended hypnotics declined by 37% (P < 0.001) in the experimental homes versus a decrease of 3% in the control homes. There was no change in the prescribing of nonrecommended anxiolytics in the experimental homes and an increase of 7% in the control homes. Nonrecommended antidepressant drugs decreased by 59% (P < 0.001) in experimental homes and by 34% (P = 0.002) in control homes.
In Wilson 2004, the mean number of audioconferences held per patient (3.3 ± 4.4) was greater than the mean number of videoconferences held (1.9 ± 1.3) (P = 0.04); there was also a reduction in the average length of treatment for the videoconference group (6.0 ± 4.5 days) compared to the audioconference group (10.2 ± 12.3 days) (P = 0.03). There were no differences in the numbr of occasions of service (12.5 ± 12.8 for audioconference group and 8.9 ± 7.9 for videoconference group, P = 0.11) or in the length of the conference (2.6 ± 1.8 minutes for audioconference group and 2.6 ± 1.0 for videoconference group, P = 0.89) for the two groups.

Secondary outcomes

Wilson 2004 reported no difference between the groups in the number of communications between health professionals recorded in the notes.

Externally facilitated interprofessional audit

Primary outcomes

In Cheater 2005, participation in the intervention program was associated with increased audit activity, with nine of the 11 teams reporting improvements to care and seven teams completing the full audit cycle. The majority of teams in the control group made no progress with undertaking audit and only two teams undertook a first data collection and implemented changes. Based on reports from six intervention teams that had completed full audits, two reports from control teams that had undertaken the first data collection and implemented changes, and a report from a control team that had undertaken the first data collection only, mean compliance with the 55 quality audit criteria was 76% for intervention teams and 45% for control teams.

DISCUSSION

Summary of main results

Daily interdisciplinary rounds in inpatient medical wards at an acute care hospital had a positive impact on length of stay and total charges (Curley 1998) but had no impact on length of stay in a community hospital telemetry ward (Wild 2004). Monthly mutlidisciplinary team meetings improved prescribing of psychotropic drugs in nursing homes (Schmidt 1998). Videoconferencing compared to audioconferencing multidisciplinary case conferences showed mixed results; there was a decreased number of case conferences per patient and shorter length of treatment but no differences in occasions of service or the length of the conference. There was also no difference between the groups in the number of communications between health professionals recorded in the notes (Wilson 2004). Multidisciplinary meetings with an external facilitator, who used strategies to encourage collaborative working, was associated with increased audit activity and reported improvements to care (Cheater 2005).
In Wild 2004, it is suggested that the negative study results could be due to the fact that many of the admission diagnoses were on a clinical pathway with standardised care, and that patients are more stable, at lower risk for complications and possibly healthier overall, so the interdisciplinary rounds provided no additional advantage. Wilson 2004 notes that the patients in their study may have been treated more quickly but the cost to the provider was the same.

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Overall completeness and applicability of evidence

While this review succeeded in locating five studies, an increase from two studies in the original review on physician-nurse collaboration, it remains a small number of studies. While the studies offer preliminary findings concerning the effectiveness of these interventions in improving healthcare processes and outcomes, the small number and methodological limitations preclude definitive conclusions. These studies included three types of practice-based IPC interventions: interprofessional rounds, interprofessional meetings, and externally facilitated interprofessional audit; RCTs of other types of interprofessional practice interventions (e.g. checklists, debriefing) were not identified. Furthermore, this review identified no RCTs in primary care or chronic care; the literature does contain IPC studies in these contexts but no RCTs were located. Given the range of types of practice-based interventions aimed at promoting IPC, as well as the different types of participants, settings, and clinical areas addressed in such interventions, further RCTs are required to provide better insight into the effectiveness of these interventions or combinations of interventions, with various target groups and in relation to particular clinical areas.

The findings reported by Wilson 2004 of no differences between the groups in the number of communications between health professionals recorded in the notes is the only data reported concerning the secondary outcome of interprofessional collaboration because of limitations in the way that it was measured in the studies. Therefore we know little about the processes of collaboration and how it contributed to changes in healthcare processes and patient outcomes.

Quality of the evidence

There were some limitations to the quality of the evidence. For example, two of the studies had small sample sizes (Wild 2004; Wilson 2004). The Wilson 2004 study lacked a control group that did not participate in any type of multidisciplinary case conferencing. Therefore, it is not possible to examine the relative effect of multidisciplinary conferencing compared to no multidisciplinary conferencing, only the effect of two alternative types of multidisciplinary conferencing. Furthermore, given that the same multidisciplinary team participated in the audioconferences and videoconferences, it is possible that contamination between the two types of multidisciplinary case conferencing occurred, which may have contributed to the mixed outcomes achieved.

The secondary outcome, interprofessional collaboration, was not well examined in the studies. Schmidt 1998 did not examine collaboration at all, and the authors acknowledge that we do not know about the teams' decision-making processes or the strategies used by pharmacists in their role as team facilitators. Curley 1998 used a non-validated survey to examine interdisciplinary communication on the ward. Wild used a questionnaire to ask about communication but this was only administered to the experimental group. Similarly, Cheater 2005 used a modified Collaborative Practice Scale, which was also only completed by the experimental group. Wilson used the number of communications between health professionals recorded in the notes to measure communication, which is a limited measurement of collaboration.

Potential biases in the review process

The authors have no personal or professional interests as to whether or not this review shows benefits of practice-based interventions on interprofessional collaboration.

Agreements and disagreements with other studies or reviews

There are no comparable reviews in this area.

AUTHORS' CONCLUSIONS

Implications for practice

The findings from the small number of studies included in this review show that practice-based interventions aimed at improving collaboration through practice changes may improve health care and patient outcomes. However, this is based on such a small number of studies that at this point, interventions to promote IPC should be labelled "promising" rather than "proven". No intervention appears in more than one study and/or in the same setting, and so consistency of findings is not confirmed. We recommend that practice-based IPC interventions be implemented within the context of rigorous evaluation studies, until further research evidence accumulates allowing confident widespread implementation of such interventions.

Implications for research

Given the evidence demonstrating the existence of IPC problems that health professionals encounter in their clinical practice (Glintborg 2007; Jacobs 2007; Kvarnstrom 2008; Reader 2007; Sutcliffe 2004; The Joint Commission 2002; The Joint

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Commission 2004; The Joint Commission 2008), it is encouraging that research on the positive effects of IPC interventions has increased since the previous review of this intervention (Zwarenstein 2000). While this research field is developing, further high-quality, multi-method studies are required. It is recommended that future randomised studies have a clear and explicit focus on IPC, longer acclimatiz\sation periods before evaluating newly implemented teamwork interventions and longer follow up. Since these are cluster randomised trials, there are going to be very few institutions (e.g. hospitals) with sufficient clusters within that single institution to conduct a single centre cluster RCT. A multi-centre study design may facilitate answering the effectiveness question, with each institution (e.g. a hospital) contributing several (preferably three or more) units (clusters), randomised within that hospital, but analysed across multiple institutions to increase sample size. Essentially each institution could be treated as a stratum (Zwarenstein 2007).

Future research should also focus on the conceptualisations and measurement of collaboration. While there are some measurement scales of collaboration, there are limitations with their validity, reliability, and the extent to which they could be used with different professional groups and to examine issues of collaborative practice. Currently, work is being undertaken on an adaptation of the Collaboration Among Medical Staff Subscale to measure collaboration amongst multiple health professional groups that typically work together in acute care (Zwarenstein 2007). The terms used in the included studies such as 'interdisciplinary' and 'multidisciplinary' have been used in this review to describe and report on the studies. These different terms used in the literature complicate examination of this field of IPC, and further work, which we are currently undertaking, is needed to clarify the conceptualisation of IPC and IPE, as well as CM, to support consistency in how these terms are used and understood. Finally, quantitative and qualitative methods should be utilised in single studies to improve our understanding of how the intervention addresses collaboration, the nature of changes in relation to collaboration that occur, and how they in turn lead to the outcomes achieved.

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* *Indicates the major publication for the study*

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CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Cheater 2005

Methods	RCT where 22 multidisciplinary teams from five acute care hospitals were randomised to an intervention group that participated in a facilitated program on multidisciplinary audit or a control group.
Participants	Nurses, physicians, professionals allied to medicine (e.g. pharmacist, social worker, physiotherapist), service support staff (e.g. ward clerk, care assistant) and managers. A range of specialties (e.g. surgery, medicine, nephrology) were represented. There were11 teams with a total of 77 participants in the intervention group and 11 teams with a total of 64 participants in the control group.
Interventions	Five facilitated meetings over 6 months with activities designed to support multidisciplinary teams to undertake an audit.
Outcomes	Participation in the intervention program was associated with increased audit activity, with nine of the 11 teams reporting improvements to care and seven teams completing the full audit cycle. The majority of teams in the control group made no progress with undertaking audit and only two teams undertook a first data collection and implemented changes. Mean compliance with the 55 quality audit criteria was 76% for intervention teams and 45% for control teams.
Notes	Study Quality: Moderate

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Quote: "Teams within the same hospital were stratified on mean self-reported KSA scores, perceived level of team collaboration and medical or surgical specialty before randomisation. The project secretary under the supervision of MK randomised 22 teams to intervention or control groups, using a computer random number generator. With the exception of two accident and emergency teams in different hospitals, teams from the same organisation were randomised in pairs."
Blinding? All outcomes	Yes	Quote: "Two members of the research team (RB and HH) independently assessed the qulity of the reports (blind to group allocation) and the percentage inter-rater agreement did not fall below 82%."

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Cheater 2005 (*Continued*)

Incomplete outcome data addressed? Professional	No	Quote: "Participation in the intervention programme was associated with increased audit activity, with 9 of the 11 teams reporting improvements to care and seven teams completing the full audit cycle. In contrast, the majority of teams in the control group had made no progress with undertaking audit and only two teams had undertaken a first data collection and implemented changes."
Incomplete outcome data addressed? Patient level	Unclear	Results are provided about the quality of the audits in relation to their compliance with the 55 quality criteria but no further information is provided in relation to any patient level outcomes.
Comparability at Baseline?	Yes	Quote: "At baseline, both groups were equivalent for all outcome variables except two. In comparison to the intervention group, the control arm reported higher levels of audit knowledge (median score 32.5 vs. 25.0 z = -3.001, P = 0.003) and skills (median score 32.5 vs. 24.6 z = - 2.990, P = 0.003). Baseline differences were adjusted for in the analysis. Baseline differences were not found for WWTs."
Reliable outcome?	Yes	Quote: "The quality of the audit was assessed from the reports submitted, using published criteria (Joint Audit Revew Group, 1995). Each criterion was equally weighted and assessed as present, absent, not applicable or not known. Two members of the research team (RB, HH) undertook independent, blind assessments and any discrepancies were discussed and resolved by a third researcher (FC)."
Contamination protection?	Yes	Only intervention teams participated in the facilitation programme.

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Curley 1998

Methods	RCT Firm trial: patients and staff from inpatient medical wards at an acute care hospital were randomised to one of six medical wards. Three wards were allocated to the intervention group that implemented daily interdisciplinary work rounds, and three wards were allocated to the control group that continued traditional work rounds.
Participants	Interns and residents in medicine, staff nurses, nursing supervisors, respirologists, pharmacists, nutritionists, and social workers. There were 535 patients in the control group and 567 in the intervention group.
Interventions	Daily interdisciplinary work rounds.
Outcomes	Mean length of stay for the patients in the interdisciplinary rounds group was 5.46 days, compared with 6.06 days for traditional care (P = 0.006) group and the mean total charges were $6,681 and $8,090 (P = 0.002) for the two groups, respectively. Regarding respiratory therapy, 73.6% of the orders for administration of aerosols in the traditional rounds group were appropriate, compared with 91.7% for the interdisciplinary rounds group (P = 0.075).
Notes	Unit of analysis error - allocated intervention to wards but analysed patients without correction for clustering. However, this correction may not substantially change conclusion because randomisation of staff and patients limits variation between clusters. Study Quality: Moderate

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Quote: "The firm system randomization procedures and their validation have been reviewed extensively in the literature. Each inpatient firm has two physician teams or ward services. For this trial the six ward services were divided so that three ward services continued traditional work rounds as usual and the three ward services implemented the CQI designed interdisciplinary work rounds, as shown in Figure 1."
Blinding? All outcomes	Yes	Quote: "Patient data were retrieved from the hospital's administrative and billing system. Thus, patient specific cost and efficiency outcomes were limited to resource utilization in the form of hospital length of stay and total charges." "...the Respiratory Therapy (RT) Department conducted a study of aerosol use appropriateness, as determined by criteria previously devised and tested by the RT Department."

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Incomplete outcome data addressed? Professional	Unclear	Quote: "The outcome measures reported in this review were at the patient level. The study does report results from satisfaction surveys completed by 19 providers of the traditional rounds group and 21 providers of the interdisciplinary rounds group but provides no information about the total number of providers in each group."
Incomplete outcome data addressed? Patient level	Yes	Quote: "Study patients included all patients admitted to the medical inpatient units between November 8, 1993, and May 31, 1994, who spent at least 50% of their hospital stay on that unit and were discharged from that unit. If patients were readmitted during the trial, each admission was considered separately." "Patient data were retrieved from the hospital's administrative and billing system."
Comparability at Baseline?	Yes	Quote: "After controlling for baseline differences in casemix using a multivariate propensity score, the length of stay and total charges for the hospital stay for the patients included in the trial were evaluated."
Reliable outcome?	Yes	Quote: "Patient data were retrieved from the hospital's administrative and billing system. Thus, patient specific cost and efficiency outcomes were limited to resource utilization in the form of hospital length of stay and total charges." "...the Respiratory Therapy (RT) Department conducted a study of aerosol use appropriateness, as determined by criteria previously devised and tested by the RT Department."
Contamination protection?	Yes	Quote: "Patients were excluded from analysis if their hospital stay was not on their assigned medical firm because they had been 'de-firmed' because of excess admissions to one service or if they were 'boarding' on a floor that was not the ward team's home floor. Patients were excluded from the trial if they were transferred from medicine to another service (e.g., surgery) or if less than 50% of their stay occurred on the medical floor...".

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Schmidt 1998

Methods	RCT of 33 nursing homes, 15 experimental homes and 18 control homes to examine monthly facilitated multidisciplinary rounds on the quality and quantity of psychotropic drug prescribing.
Participants	Physician, pharmacists, selected nurses and nursing assistants. 1854 long-term residents: 626 in experimental homes and 1228 in control homes.
Interventions	Pharmacist led team meetings once a month over a period of 12 months.
Outcomes	The average number of drugs prescribed in the experimental homes was the same before and after the intervention (2.07% before intervention and 2.08% after intervention), the average number of drugs increased by 7% in the control homes (2.06% before intervention to 2.20% after intervention, P =.02). The use of nonrecommended hypnotics declined by 37% (P < .001) in the experimental homes versus a decrease of 3% in the control homes. There was no change in the prescribing of nonrecommended anxiolytics in the experimental homes and an increase of 7% in the control homes. Nonrecommended antidepressant drugs decreased by 59% (P < .001) in experimental homes and by 34% (P = .002) in control homes.
Notes	Study Quality: High

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	Quote: "Thirty-six nursing homes, representing 5% of all nursing homes in Sweden, participated in the study. The sampling process consisted of three steps. At the time of the study, the National Corporation of Swedish Pharmacies was organized into 36 regions, 18 of which were randomly selected for this study. Each regional pharmacy director then selected two facilities in his or her region using several criteria....Researchers randomly assigned one home in each pair to receive the intervention."
Blinding? All outcomes	Yes	Quote: "Lists of each resident's prescriptions were collected 1 month before and 1 month after the 12-month intervention in both experimental homes and control homes. Trained coders, supervised by pharmacists, classified and coded all scheduled and PRN (pro re nata) orders."

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Schmidt 1998 (*Continued*)

Incomplete outcome data addressed? Patient level	Yes	Quote: "We analyzed rates of prescribing before and after the 12-month intervention using the individual resident as the unit of analysis. All permanent residents were included even though they may have resided in the facility less than 12 months."
Comparability at Baseline?	Yes	Quote: "There were no significant differences in the demographic, functional, or psychiatric characteristics of residents in experimental and control homes at baseline." Quote: "The overall level of prescribing was similar in experimental and control homes before the intervention (Table 2). At baseline, we found no significant differences in the proportion of residents with scheduled psychotropics (64% vs 65%), number of drugs among residents with psychotropics (2.07 vs 2.06), or proportion of residents with polymedicine (46% vs 47%). Baseline rates of therapeutic duplication were also comparable in the experimental and control homes."
Reliable outcome?	Yes	Quote: "List of each resident's prescriptions were collected 1 month before and 1 month after the 12-month intervention in both experimental homes and control homes....For each drug, we recorded medication name and orders for administration, including route and dosage changes during the month. Drugs were classified using the Anatomical Classification System recommended by the World Health Organization - Europe."
Contamination protection?	Yes	Quote: "Pharmacists assigned to experimental homes had no contact with control nursing homes. In the control homes, no efforts were made beyond normal routine to influence drug prescribing."

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Wild 2004

Methods	RCT where patients in inpatient telemetry ward in a community hospital were randomised to the intervention medical team which conducted interdisciplinary rounds or to the control team which provided standard care.
Participants	Resident physicians, nurses, a case manager, pharmacist, dietitian, and physical therapist. Eighty four patients were enrolled: 42 in intervention and 42 in standard care.
Interventions	Daily interdisciplinary rounds
Outcomes	No difference in length of hospital stay between the experimental group (3.2 $\pm$ 2.7 days) and the control group (3.2 $\pm$ 3.2 days) (P = 0.90).
Notes	Study Quality: Moderate

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	Quote: "Randomization was performed using random numerical assignments in presealed envelopes."
Blinding? All outcomes	Yes	Quote: "Charts were surveyed to determine patient characteristics and LOS. LOS was measured as the difference between discharge and admission date."
Incomplete outcome data addressed? Professional	Yes	Quote: "Questionnaire return was 80%" but these results are not reported in this review because they did not meet outcome criteria.
Incomplete outcome data addressed? Patient level	Yes	Quote: "A total of 102 patients met the inclusion criteria of the study. After randomization, 18 had to be excluded from the analysis because of complications, transfer to other units, randomization error, etc."
Comparability at Baseline?	No	Quote: "There were no significant differences between groups for admission diagnosis; number of co-morbidities; number of abnormal laboratory data; ability to perform activities of daily living; presence of dementia or diabetes, or whether there was a home health aide. In spite of randomization, the gender composition between groups was somewhat different...and the number of readmissions in the IR-Team was higher than in the non-IR-Team (P =

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		0.003)."
Reliable outcome?	Yes	Quote: "Charts were surveyed to determine patient characteristics and LOS. LOS was measured as the difference between discharge and admission date."
Contamination protection?	Yes	Quote: "Patients were randomly assigned to two medical teams: the intervention group received IRs and the control subjects received standard care."

Wilson 2004

Methods	RCT comparing multidisciplinary audioconferencing and multidisciplinary videoconferencing with a team that worked at two hospitals.
Participants	Medical staff specialists, medical registrars, nurses, speech pathologist, occupational therapists, social worker, medical students. Fifty patients were randomly assigned to each group.
Interventions	Multidisciplinary audioconferences and videoconferences. At each conference session, the audioconferences were conducted before the videoconferences with the same multidisciplinary team.
Outcomes	The mean number of audioconferences held per patient (3.3 $\pm$ 4.4) was greater than the mean number of videoconferences held (1.9 $\pm$ 1.3) (P = 0.04); there was also a reduction in the average length of treatment for the videoconference group (6.0 $\pm$ 4.5 days) compared to the audioconference group (10.2 $\pm$ 12.3 days) (P = 0.03). There were no differences in the number of occasions of service (12.5 $\pm$ 12.8 for audioconference group and 8.9 $\pm$ 7.9 for videoconference group, P = 0.11) or in the length of the conference (2.6 $\pm$ 1.8 minutes for audioconference group and 2.6 $\pm$ 1.0 for videoconference group, P = 0.89) for the two groups. There was no difference between the groups in the number of communications between health professionals recorded in the notes.
Notes	Study Quality: Moderate

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	Quote: "The random allocation was done by an independent administrative assistant, using a table of random numbers."
Blinding? All outcomes	Yes	Quote: "Conference times were recorded by an independent observer and files were reviewed by an independent medical prac-

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		titioner blinded to the randomization."
Incomplete outcome data addressed? Professional	No	Only 14 of 29 (including 6 medical students) completed a staff satisfaction survey. These results are not reported in this review because they did not meet outcome criteria.
Incomplete outcome data addressed? Patient level	Yes	Quote: "There were no deaths and all patients recruited completed the trial."
Comparability at Baseline?	Yes	Quote: "The two groups were similar in terms of age, sex and diagnosis (Table 1)."
Reliable outcome?	Yes	Quote: "The effectiveness of the intervention compared with the control was determined by the following outcome measures: number of case conferences per patient, average length of conference, length of treatment, number of occasions of service (provided by nurisng and allied heatlh staff), degree of multidisciplinary team involvement, recorded level of communication, documentation of the occurrence of the conference..."
Contamination protection?	Unclear	Quote: "Within each meeting of the multidisciplinary team, the audioconferences were conducted before the videoconferences, to ensure that there was no visual contact between the two locations until the latter part of the session." "The team remained consistent at either site for both the audio- and videoconferences held on each individual day of the conference, but the team members rotated between sites over the study period." While measures were taken to prevent contamination, the same team members were involved in both types of conferencing.

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Characteristics of excluded studies *[ordered by study ID]*

Ahlmen 1988	Not a practice-based IPC intervention
Allen 2002	Not a practice-based IPC intervention
Arean 2005	Not a practice-based IPC intervention
Arthur 2002	Not a practice-based IPC intervention
Austrom 2005	Not a practice-based IPC intervention; not a RCT
Barreca 2003	Not a practice-based IPC intervention
Bauer 2006	Not a practice-based IPC intervention
Bauer 2006a	Not a practice-based IPC intervention
Biro 2000	Not a practice-based IPC intervention
Biro 2003	Not a practice-based IPC intervention
Bogden 1997	Not a practice-based IPC intervention
Bogden 1998	Not a practice-based IPC intervention
Boudreau 2002	Not a practice-based IPC intervention
Boult 2001	Not a practice-based IPC intervention
Brown 2000	Not a practice-based IPC intervention
Brumley 2007	Not a practice-based IPC intervention
Bush 2004	Not a practice-based IPC intervention
Byng 2004	Not a practice-based IPC intervention
Callahan 2005	Not a practice-based IPC intervention
Callahan 2006	Not a practice-based IPC intervention
Caplan 2004	Not a practice-based IPC intervention
Cohen 2002	Not a practice-based IPC intervention
Covinsky 1998	Not a practice-based IPC intervention

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(*Continued*)

Craig 2003	Not a practice-based IPC intervention
Craig 2004	Not a practice-based IPC intervention
Crotty 2004	Not a practice-based IPC intervention
de Cruppe 2005	Not a practice-based IPC intervention
Donnelly 2004	Not a practice-based IPC intervention
Emmanuel 2002	Not a practice-based IPC intervention
Engels 2006	Not a practice-based IPC intervention
Ettner 2006	Not a practice-based IPC intervention
Faber 2005	Not a practice-based IPC intervention; not a RCT
Finley 2003	Not a practice-based IPC intervention
Forster 2005	Not a practice-based IPC intervention
Gholve 2005	Not a practice-based IPC intervention; not RCT
Hillman 2005	Not a practice-based IPC intervention
Hiss 2007	Not a practice-based IPC intervention
Homer 2001	Not a practice-based IPC intervention
Homer 2005	Not a practice-based IPC intervention
Horbar 2001	Not a practice-based IPC intervention
Inouye 1993	Not a practice-based IPC intervention; not a RCT
Isouard 1999	Not a practice-based IPC intervention; not a RCT
Jitapunkul 1995	Not a RCT
Jones 1999	Not appropriate outcome
Kalra 2005	Not a practice-based IPC intervention
Kousgaard 2003	Not a practice-based IPC intervention

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(*Continued*)

Kucukarslan 2003	Not a practice-based IPC intervention
Lakhani 1984	Not a practice-based IPC intervention
Leape 1999	Not a practice-based IPC intervention
Lozano 2004	Not a practice-based IPC intervention
Moore 2003	Not a practice-based IPC intervention
Mudge 2006	Not a RCT
Naglie 2002	Not a practice-based IPC intervention
Nielsen 2007	Not a practice-based IPC intervention
Peiss 1995	Not a practice-based IPC intervention
Ratcliffe 1996	Not a practice-based IPC intervention
Reid 2002	Not a practice-based IPC intervention
Render 2006	Not a practice-based IPC intervention
Rogowski 2001	Not a practice-based IPC intervention; not a RCT
Rowlands 2003	Not a practice-based IPC intervention
Sellors 2003	Not a practice-based IPC intervention
Slimmer 2003	Not a practice-based IPC intervention
Solberg 2000	Not a practice-based IPC intervention
Sulch 2000	Not a practice-based IPC intervention
Sulch 2002	Not a practice-based IPC intervention
Taylor 2005	Not a practice-based IPC intervention
Thomas 2007	Not a practice-based IPC intervention
van der Feltz-Cornelis 2006	Not a practice-based IPC intervention
Weingarten 1985	Not a practice-based IPC intervention

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(*Continued*)

Zimmer 1985	Not a practice-based IPC intervention

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DATA AND ANALYSES

This review has no analyses.

APPENDICES

Appendix 1. Original review MEDLINE search strategy

In the original review, the MEDLINE and other searches were completed in November 1999 using the Cochrane search strategy for controlled trials and either the MeSH heading inter-professional relations or terms referring to medical and nursing staff, either as MeSH headings or as text words in the abstract, as follows:

1 exp interprofessional relations/
2 multidisciplinary team?.tw.
3 multi disciplinary team?.tw.
4 interdisciplinary team?.tw.
5 inter disciplinary team?.tw.
6 ((doctor? or physician?) adj5 nurse? adj5 collaborat$).tw.
7 1 or 2 or 3 or 4 or 5 or 6
8 randomized controlled trial.pt.
9 controlled clinical trial.pt.
10 intervention studies/
11 experiment$.tw.
12 (time adj series).tw.
13 (pre test or pretest or (posttest or post test)).tw.
14 random allocation/
15 impact.tw.
16 intervention?.tw.
17 chang$.tw.
18 evaluation studies/
19 evaluat$.tw.
20 effect?.tw.
21 comparative studies/
22 animal/
23 human/
24 22 not 23
25 or/8-21
26 25 not 24
27 7 and 26

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Appendix 2. CINAHL search strategy

1 exp Interprofessional Relations/ and (collaborat$.mp. or team$.tw.)
2 exp Multidisciplinary Care Team/ and (collaborat$.mp. or team$.tw.)
3 ((interprofession$ or inter-profession$) adj (collaborat$ or team$)).tw.
4 ((interdisciplin$ or inter-disciplin$) adj (collaborat$ or team$)).tw.
5 ((interoccupation$ or inter-occupation$) adj (collaborat$ or team$)).tw.
6 ((multiprofession$ or multi-profession$) adj (collaborat$ or team$)).tw.
7 ((multidisciplin$ or multi-disciplin$) adj (collaborat$ or team$)).tw.
8 ((multioccupation$ or multi-occupation$) adj (collaborat$ or team$)).tw.
9 ((transdisciplin$ or trans-disciplin$) adj (collaborat$ or team$)).tw.
10 (team$ adj collaborat$).tw
11 or/1-10
12 exp clinical trials/
13 clinical trial.pt.
14 (clinic$ adj trial$1).tw.
15 ((singl$ or doubl$ or trebl$ or tripl$) adj (blind$3 or mask$3)).tw.
16 "randomi?ed control$ trial$".tw.
17 random assignment/
18 (random$ adj allocat$).tw.
19 placebo$.tw.
20 Placebos/
21 Quantitative Studies/
22 (allocat$ adj random$).tw.
23 or/12-22
24 11 and 23
25 from 24 keep 1-269

Appendix 3. EPOC Register search strategy

(interprofession* or inter-profession* or interdisciplin* or inter-disciplin* or inter-occupation* or interoccupation* or inter-institut* or interinstitut* or interagenc* or inter-agenc* or inter-sector* or intersector* or multi-profession* or multiprofession* or multi-institut* or multiinstitut* or multi-agenc* or multiagenc* or multi-sector* or multisector* or multiorganisation* or multi-organisation* or multiorganization* or multidisciplin* or interorganisation* or inter-organisation* or interorganization* or interdepartment* or team* or multi-disciplin*)
and
(collab* or liais* or cooperat* or shared or joint or integrat*)

WHAT'S NEW

Last assessed as up-to-date: 16 September 2007.

13 May 2009	New search has been performed	New search and four additional studies identified and included in the review.
13 May 2009	New citation required and conclusions have changed	Conclusions changed based on additional studies.

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HISTORY

Protocol first published: Issue 3, 1996

Review first published: Issue 2, 1997

20 August 2008	New search has been performed	Converted to new review format.
11 January 2000	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

There was a joint effort to conceiving, designing, coordinating and collecting data for the review. All authors analysed and interpreted the data and wrote the review. MZ is guarantor for the review.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- Li Ka Shing Knowledge Institute of St Michael's Hospital, CANADA, Not specified.
- Continuing Education and Professional Development, Faculty of Medicine, University of Toronto, CANADA, Not specified.

External sources

- Canadian Institutes of Health Research, CANADA, Not specified.

INDEX TERMS

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Medical Subject Headings (MeSH)

*Cooperative Behavior; *Health Personnel; *Interprofessional Relations; *Professional Practice; Delivery of Health Care; Quality of Health Care; Randomized Controlled Trials as Topic; Telecommunications

MeSH check words

Female; Humans

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