



REVIEW ARTICLE



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Patient-centered care and interprofessional collaboration in medical resident education: Where we stand and where we need to go

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Patient centered care (PCC) and interprofessional collaboration (IPC) remain important goals for all healthcare systems. While these tenets are a cornerstone of training for nursing and allied health professionals (AHPs), their role in internal medicine resident (IMR) training is unstructured and limited. We performed a narrative review to answer two questions, firstly ‘what is known about the attitudes and behaviors of internal medicine (IM) physicians and trainees with respect to PCC and IPC and how does this compare to AHPs?’ and secondly, ‘what evidence based interventions have been trialed to promote PCC and IPC in medical training?’ We searched databases including Cochrane, Medline, Embase, CINAHL and MedPortal. We reviewed 102 publications and found that medical residents tend to value PCC less than non-physician trainees. Hierarchical professional attitudes and a poor understanding of AHP roles are barriers to IPC, whereas diminished time for direct patient care, neglect of the patient’s context and social determinants of health, and lack of self-reflection are barriers to PCC. Published educational interventions for IMRs and AHPs have included classroom sessions, structured ward- and clinic-based interprofessional (IP) work, post-discharge care, home visits, and reflective practice. Interventions were evaluated using questionnaires/surveys, focus groups, tests, primary outcome assessments and ethnographic analysis. The most promising interventions are those that allow learners time for multi-disciplinary observation, holistic patient assessments, engagement in care transitions and reflective practice. Based on the review findings we have made recommendations for integration of IPC and PCC training into IMR curricula. Future educational interventions should allow IMR observerships in a multidisciplinary team, introduce residents to the patient’s environment through home visits, incorporate patient/family perspectives in care, and include narrative reflections as part of professional development. Based on our findings and recommendations, these experiences can provide IMRs with much-needed exposure to collaborative, patient-centric care early in postgraduate training.

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Introduction

There is a rising focus on patient-centered care (PCC), interprofessional collaboration (IPC) and medical home models within healthcare systems around the world (Doolittle et al., 2015). However, medical training does not emphasize the skills and values needed to provide ‘compassionate, collaborative care’ (CCC) (Lown et al., 2016). Orchard et al. (2005) define interdisciplinary care as “a partnership between a team of health professionals and a client in a participatory, collaborative, and coordinated approach to share decision-making around health issues” (Orchard et al., 2005). While these tenets are a cornerstone of training for nursing and allied health professionals (AHPs) (Macdonald et al., 2010; Rotegard et al., 2010), their role in traditional internal medicine (IM) residency training has been unstructured and limited. Current IM residency programs tend to be acute care based; within this setting, PCC training is limited due to inadequate time for direct patient care, lack of follow-up once the patient is discharged, and focus on medical more than the social determinants of health (Schattner, 2017). Another major factor thought to negatively impact PCC is ineffective collaboration amongst health care professionals (Reynolds et al., 1994; Gallagher and Gallagher, 2012) likely attributable to power imbalances, poor communication, lack of confidence and an inadequate understanding of the scope of practice of other disciplines (Orchard et al., 2005). Interprofessional education and collaborative interventions have been shown to have a positive impact on health care processes and patient outcomes (Zwarenstein and Reeves, 2006). Transformation of current medical education models is required to meet to the needs of the future healthcare work force.

A scoping review of 43 articles concluded that PCC must be reinforced as a core value during early postgraduate years so that it becomes systemic, while also shifting education from a uni-professional to inter-professional focus (Gillespie et al., 2017). It is thus increasingly important for internal medicine residents (IMRs) to be trained in patient-centered skills, including communication with patients and community members, and collaboration with multidisciplinary teams in non-acute care settings. The Canadian Interprofessional Health Collaborative has identified six interprofessional competency domains: interprofessional communication, patient/client/family/community-centered care, role clarification, team functioning, collaborative leadership and interprofessional conflict resolution (Canadian Interprofessional Health Collaborative, 2020). It is the responsibility of IM programs to ensure training in these core competencies to promote skills and positive attitudes in the arena of IPC and PCC.

In this qualitative narrative study, we review the attitudes and behaviors of IM physicians and residents with respect to IPC and PCC as compared to other AHPs. Appreciation of these values is a prerequisite for their adoption through training. In addition, we review educational interventions that have been trialed and observed to promote IPC and PCC amongst IMRs and AHPs. Based on these findings, we make recommendations for enhanced PCC interventions in IMR postgraduate training.

Methods

Identifying the review question. The review questions were discussed and agreed upon by all authors. The first question identified was ‘what is known from existing publications about the attitudes and behaviors of IM physicians and trainees with respect to PCC and IPC and how does this compare to AHPs?’ The second question was ‘what interventions have been trialed and presented in the literature to promote PCC and IPC amongst IM trainees and physicians?’

Identifying and selecting relevant studies. Figure 1 summarizes the search strategy used. We searched MEDLINE, CINAHL plus, Cochrane Library, MedEdPortal and Pubmed. Keywords used were internal medicine, training/education/residency, patient/client-centered care, inter-professional/multi-disciplinary/interdisciplinary and nursing/allied health. Screening of search results was done by the first author using inclusion and exclusion criteria described in Fig. 1. Following the removal of duplicate abstracts, 111 studies were shortlisted for review. However, 3 papers could not be accessed and 6 were found to be irrelevant.

Summarizing and reporting the relevant studies. The remaining 102 papers were reviewed by the first author and manually sorted into one of the following three themes using an inductive approach: (1) description of attitudes and behaviors surrounding IPC and/or PCC; (2) description of one or more interventions to target IPC and/or PCC; and, (3) non-primary research articles describing a need for IPC and/or PCC curriculum or system-based change. The third author then independently reviewed the 102 papers and assigned each to one of the three themes identified by the first author. Subsequently, the two authors met to discuss differences and re-assigned papers to themes as needed. Papers from the three themes are summarized and presented in Tables 1–3, respectively. In instances where multiple articles stemmed from the same research project, the overlapping publications were summarized into the same row. Following summarization, one or more categories was assigned to each paper. Categories were not predetermined but were discerned by the first author after the first round of reviews. The final categories were coded into each theme/table (summarized in Fig. 1). The first author assimilated the findings from papers with a particular category assignment and used the conclusions to design a discussion section that would answer one of the two review questions. The second and third authors then took turns reviewing the categories and the resulting discussion sections and made the necessary changes. Some papers, especially those with multiple assigned categories, were used in more than one discussion section. The discussion sections generally transcend multiple themes, that is, they include papers from one or more tables. Given the variability of publication types, study populations, methods, and outcome measures, we used a qualitative narrative approach to summarize and report data.

Results

Table 1 summarizes 37 primary research papers that provided a description of attitudes and behaviors surrounding IPC and/or PCC amongst physicians, medical trainees and/or allied health. Evaluations of attitudes in these papers was done by varying combinations of patients, physicians, trainees, nurses, AHPs and administrative staff, as noted under the ‘study population’ column. In addition, we summarized salient points regarding the study design and evaluation methods used and provided insights into relevant study conclusions.

Table 2 summarizes 36 papers that reported one or more real-time or simulated interventions to target IPC and/or PCC. Real-time interventions were conducted in real patient care scenarios and in the context of real interprofessional teams, whereas simulated interventions included standardized scenarios, theoretical cases and classroom-based learning. In studies involving IMRs/physicians, study populations ranged from ‘only IM physicians/residents’ to ‘collaboration with AHPs or specialties’ to working in ‘interprofessional teams’. Amongst other non-physician health professionals, the study populations ranged from graduate non-physician programs, pharmacy, nursing and medical students, internationally educated health professionals,

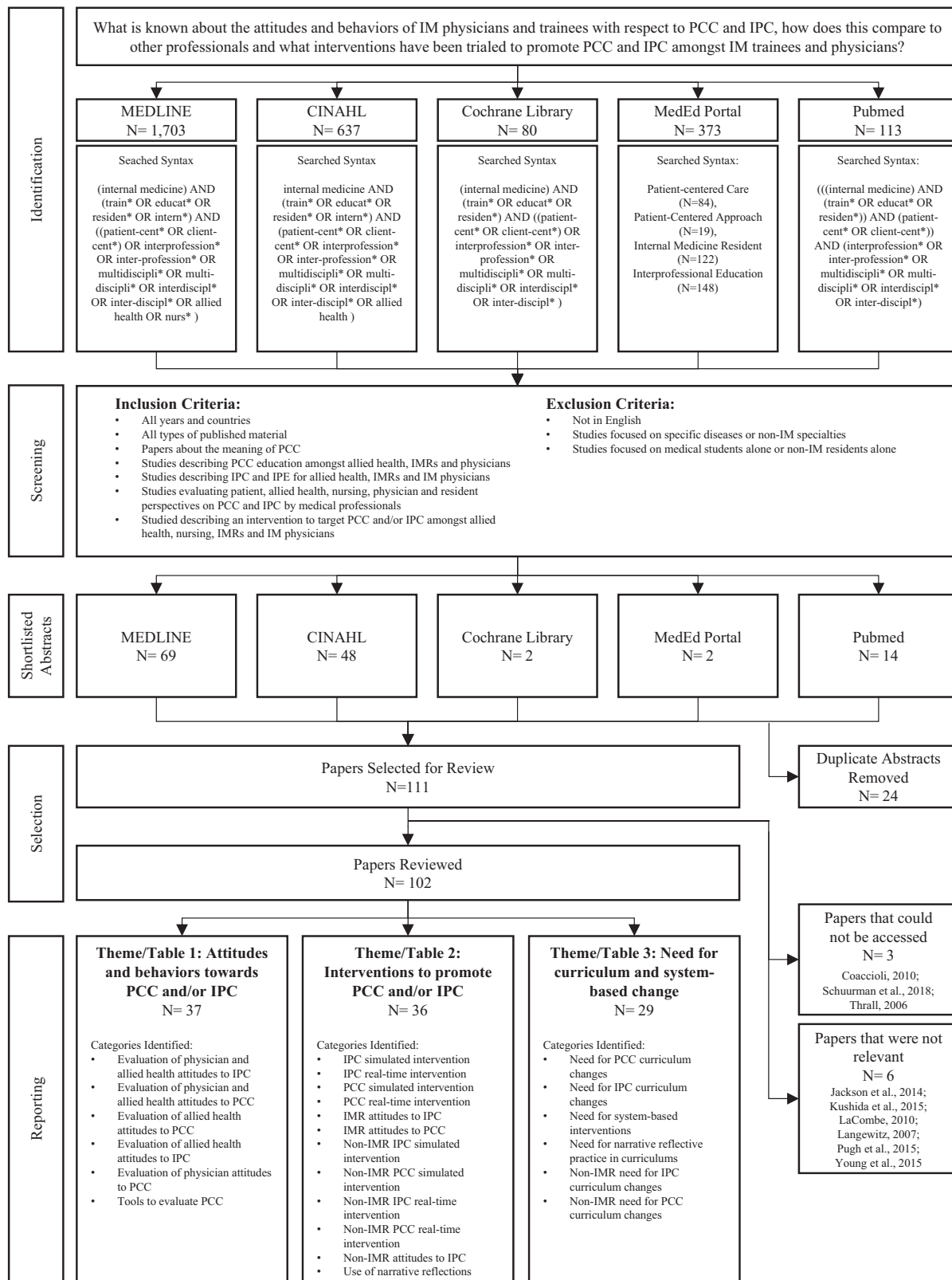


Fig. 1 Search strategy. PCC patient-centered care, IPC interprofessional collaboration, IM internal medicine, IPE interprofessional education, IMR internal medicine residents.

multidisciplinary ward teams, and miscellaneous participants. PCC interventions included classroom sessions, structured ward-based rotations with a focus on post-discharge care, home visits, palliative care experience, reflective practice and a combined IM/

alternative medicine program. IPC interventions included one or more classroom sessions, online sessions, structured ward-based IP learning, continuity clinics, home visits, and systems based practice training. Interventions were evaluated using a

Table 1 Publications about attitudes and behaviors (n = 37).

| Article | Assigned category | Country of publication—study population | Study design | Evaluation methods | Conclusions |
|------------------------|--|--|---|--|--|
| Sidani et al. (2018) | Evaluation of physician and allied health attitudes to PCC | Canada—physicians, nurses, social workers and other healthcare providers | 382 consenting professionals in a large scale cross-sectional study in 18 hospitals completed a questionnaire assessing three PCC components (holistic, collaborative, and responsive care) and responded to standard questions inquiring about their characteristics and workload. This study aimed to examine the professionals' practices while exploring their characteristics (gender, work experience) and contextual factors (caseload) | - Self-reported questionnaire | - Physicians reported higher levels of enacting holistic care - physicians, AHPs and SWs reported implementing higher levels of collaborative care - physicians, nurses, AHPs reported higher levels of providing responsive care - caseload influenced holistic care practices - IPE and training strategies are needed to address professional differences in valuing and practicing PCC |
| Smith et al. (2015) | Evaluation of physician and allied health attitudes to IPC | USA—faculty and trainees from medicine, nursing, psychology and pharmacy post-graduate programs | This is a comparative study to identify traditional discourses of four post-graduate professions to identify overarching versus profession-specific competencies, followed by a review of sources to identify socio-historical influences that lead to these differences. A process called professional equipoise was used to defuse participants' discursive assumptions and develop appreciation for the discursive contributions of other professions. | - Data includes formal and informal written and spoken language - focus groups - 2 or more members from each program reviewed 52 peer reviewed articles, 35 books, all 50 states' licensure requirements and 20 policy documents | - Physicians, nurses, pharmacists and psychologists were associated with empirical, caring, therapeutic and conceptual discourse, respectively - different discourses were pervasive, led to unhelpful stereotypes of each other - dominant discourses and their associated stereotypes are extremely powerful in IP group dynamics |
| Gachoud et al. (2012) | Evaluation of physician and allied health attitudes to PCC | Canada—SWs, nurses and physicians on a GIM ward | Interpretative phenomenological approach and interviews of 10 social workers, 10 nurses and 8 physicians on a GIM ward to determine how participants experience their work life and elicit what being patient-centered means to them. | - Semi-structured interviews - 10 open-ended questions - purposeful sampling technique | - Participants expressed appreciation for PCC but with a sense of a hierarchy of patient-centeredness across professions; SW and nursing regarded themselves as more patient-centered than others. whereas physicians seemed inclined to accept their lower position in this hierarchy |
| Kashner et al. (2017) | Evaluation of physician and allied health attitudes to IPC Evaluation of physician and allied health attitudes to PCC | USA—medical students, resident physicians, non-physician trainees | Nationally administered survey of 56,569 medical students and residents, compared with 78,038 non-physician trainees to assess how changes in curriculum, accreditation standards, and certification/licensure competencies impact medical student and resident attitudes to IPC and PCC | - Department of Veterans Affairs Learners' Perceptions Survey (2003–2013) - value preferences scored as independent adjusted associations | - Physician trainees valued interprofessional (14 vs. 37%, $p < 0.001$) and patient-centered (21% vs. 36%, $p < 0.001$) learning less than non-physician counterparts. - physician preferences for IP learning showed improvement with training years (2.5%/year, $p < 0.001$), driven mostly by IM and surgery residents, independent of trainees' academic progress. |
| Sidani et al. (2016) | Evaluation of physician and allied health attitudes to PCC | Canada—patients, physicians, nurses and other healthcare providers | This is a cross-sectional study to compare health professionals' and patients' perceptions of PCC. 401 health professionals and 500 patients in acute care settings completed a questionnaire on PCC | - Self-reported questionnaire | - Patients had lower ratings of PCC than health professionals - patients had low-moderate view of their care in contrast with a more positive view by health professionals |
| Thrysoee et al. (2018) | Evaluation of physician and allied health attitudes to PCC | Denmark—14 patients newly diagnosed with atrial fibrillation referred from general practitioners | This 2-year qualitative, descriptive design study followed an ethnographic approach to gain in-depth knowledge of patients' experiences of the consultation processes at a | - Data collected from participant observation during each consultation, followed by semi-structured individual patient interviews post-consultation | - Study demonstrated lack of PCC and absence of tailored patient education, patients were uncertain on what AF was both before and after their consultation. - visiting the clinic was |

Table 1 (continued)

| Article | Assigned category | Country of publication—study population | Study design | Evaluation methods | Conclusions |
|---------------------------|--|---|---|--|--|
| Weiner et al. (2007) | Tools to evaluate PCC | USA—54 IMRs | multidisciplinary atrial fibrillation outpatient clinic. Pilot study to develop and test a methodology for measuring physicians' performance at contextualizing care. The authors drafted cases embedded with biomedical and/or contextual information that is essential to planning care. Once cases were validated, 54 IMRs were tested. | - Data were collected on information elicitation and error making | overwhelming, information was difficult to understand, and patients found it difficult to be involved in decision-making - Piloting of these validated cases unmasked previously unmeasured differences in physician performance at contextualizing care - this pilot study demonstrates a methodology for measuring physician performance and tracking contextual errors in medical decision making |
| Weiner et al. (2010) | Evaluation of physician attitudes to PCC | USA—physicians in 14 practices, including academic and community settings | Incomplete randomized block design in which unannounced, standardized patients visited 111 IM physicians over 2 years and presented variants of 4 scenarios with both a contextual and a biomedical red flag. The aim was to explore the frequency and circumstances under which physicians probe contextual (such as transportation needs, economic situation or caretaker responsibilities) and biomedical red flags and avoid treatment error. | - Responses to probing about flags varied in whether they revealed an underlying complicating biomedical or contextual factor (or both) that would lead to errors in management if overlooked | - Physicians probed fewer contextual (51%) than biomedical red flags (63%) - physicians provided error-free care in 73% of uncomplicated encounters, 38% of biomedically complicated encounters and 22% of contextually complicated encounters |
| Card et al.(2014) | Evaluation of physician and allied health attitudes to IPC | Canada—IMRs, IM physicians, AHPs | The perceptions of IP roles (self and others) at patient discharge from an IM CTU was assessed with a goal to explore IPC amongst IMRs and identify methods to teach collaborative competency | - Survey of 69 participants (25, IMRs, 9 IM faculty, 35 AHPs) | - IMRs agreed on 62% of discharge roles, with substantial disagreement for the remainder - AHPs had similar lack of clarity about IMR roles at discharge |
| Muller-Juge et al. (2013) | Evaluation of physician and allied health attitudes to IPC | Switzerland—IMRs and IM nurses | 14 IMRs and 14 IM nurses were interviewed and completed a questionnaire to explore IMRs' and nurses' perceptions and expectations of their own and each other's professional roles on a GIM ward | - Thematic content analysis of interviews - questionnaire asked about expected actions in 11 clinical scenarios | - There are discordant perceptions and unmet expectations among nurses and IMRs about each other's roles, including nurses' autonomy in patient management, nurses' participation in decision-making, professional interdependence and IMRs' implication in teamwork |
| Garth et al. (2018) | Evaluation of physician and allied health attitudes to IPC | USA—nurses, social workers, case managers, dietitians, rehabilitation therapists and pharmacists at an academic center, mostly in the inpatient setting | A qualitative study design was employed to determine non-physician views on barriers to collaboration with physicians, as well as factors that contribute to good collaborative relationships | -Data collected from individual interviews and focus groups comprising non-physician healthcare professionals | - Impediments to physician IPC include poor understanding of roles and processes for non-physicians - positive physician behaviors include mutual support such as backing up team members and prioritizing multidisciplinary rounds and good communication such as keeping team members informed, asking for their input and practicing joint problem-solving. |
| Bochatay et al. (2017) | Evaluation of physician and allied health attitudes to IPC | Switzerland—IMRs and IM nurses | 14 IMRs and 14 IM nurses were interviewed about their role perceptions, and then randomly paired to manage two simulated clinical cases. The goal was to evaluate whether there was a relationship between role perceptions and actual actions in practice | - Interviews analyzed with general inductive approach to identify 13 role components - descriptive and kappa statistics were used to assess role components in interviews versus in simulations | - Overall statistically significant but modest relationship between role perceptions and actions but with notable discrepancies - role ambiguities need to be addressed in IPE with emphasis on flexibility required in role boundaries |

Table 1 (continued)

| Article | Assigned category | Country of publication—study population | Study design | Evaluation methods | Conclusions |
|---------------------------|--|---|--|--|--|
| Blondon et al. (2017) | Evaluation of physician and allied health attitudes to IPC | Australia—physician and nurse pairs | The choices and management actions of 14 doctors and 14 nurses in six clinical nurse role scenarios, and in five doctor role scenarios (6 options per scenario) were analyzed. The goal was to identify factors influencing concordance on their expectations of roles and responsibilities while adjusting for confounders such as prior IM experience and gender | - Participants filled out a questionnaire with 11 clinical scenarios, tailored for either physicians or nurses | - Concordance was associated with number of female professionals, acute situations and in doctor role scenarios - prior experience and country of training were not significant predictors of concordance - this concordance-based approach helped identify targetable areas for future IP educational interventions |
| Zwarenstein et al. (2017) | Evaluation of physician and allied health attitudes to IPC | Canada—physicians, nurses and AHPs on General Internal Medicine (GIM) wards | Large qualitative study of directly- observed interactions amongst professions on GIM wards, describing structure and conversations to better understand current patterns of interprofessional communications | - 155 h of data-collection, including observation, one-on-one shadowing, ethnographic and semi-structured interviews - data coded and analyzed thematically | - Physicians communicated with other professions mainly in structured rounds in a terse and patient-specific manner; non-physician observations were often overlooked and IP discussion was rare - interactions amongst AHPs, were frequent and deliberative but rarely involved physicians - physician decisions taken in isolation fail complex patients who need tailored, IP care |
| Chesluk et al. (2010) | Evaluation of physician and allied health attitudes to IPC | USA—physicians, AHPs, office professionals and patients in a solo practice, a certified patient-centered medical home and a multiphysician, multispecialty practice | An ethnographic approach was used to explore aspects of practice that teams are not aware of or take for granted. This is a field study in three primary care practices based on systematic observation and analysis of human culture. | - Analysis of field notes led to the discovery of recurrent topics or themes, which provided the basis for generating hypotheses | - Perspectives were characterized by three labels: the frantic bubble (physicians), the flexible team (office professionals and staff) and in limbo (patients) - physician workdays comprised a series of nonstop, one-on-one patient interactions with little or no interaction with team members - members related to each other similarly in all 3 practices; practice teams operated in separate social “silos,” isolating physicians from each other and from the rest of the practice staff - medical residents were less positively inclined towards interdisciplinary teamwork than other disciplines |
| Leipzig et al. (2002) | Evaluation of physician and allied health attitudes to IPC | USA - Year 2 IMRs and family practice residents, advanced practice nurses (NP) and masters-level social work (MSW) students | 591 participants on the Geriatrics Interdisciplinary Team (IDT) were surveyed to determine attitudes toward the value and efficiency of interdisciplinary teamwork and the physician’s role on the team | - baseline survey | - IP differences were greatest for beliefs about physician’s roles; 73% of PGY-2s but only 44/47% of MSW/NP trainees agreed that a team’s primary purpose was to assist physicians in achieving treatment goals for patients. 80% of PGY-2s but only 35/40% of MSW/NP trainees agreed that physicians have the right to alter patient care plans developed by the team |
| Thomson et al. (2015) | Evaluation of physician and allied health attitudes to IPC Evaluation of physician and allied | Australia—pharmacy, nursing, and medicine graduates | This study explored the attitudes and experiences of 68 recent healthcare graduates regarding IP teamwork and communication in a clinical setting. | - 12 semi-structured focus group discussions - Social Identity and Realistic Conflict theories were used as a framework for qualitative data analysis | - a consistent pattern of profession-focused, rather than patient- or team-focused goals was revealed with reports of negative stereotyping, hierarchical communication, and competition for time with patients |

Table 1 (continued)

| Article | Assigned category | Country of publication—study population | Study design | Evaluation methods | Conclusions |
|--|---|---|---|--|---|
| | health attitudes to PCC | | | | - graduates acknowledged the importance of PCC, communication and teamwork and the need for better understanding of roles of other health professionals |
| Horsburgh et al. (2006) | Evaluation of physician and allied health attitudes to IPC | New Zealand—students entering undergraduate medicine, nursing and pharmacy programs | Students entering three different healthcare undergraduate programs completed a questionnaire to determine their attitudes, beliefs and values towards clinical work organization | - Questionnaire adapted from studies of professional subcultures working in the health system in Australia, New Zealand, England | - Professional socialization begins even before students enter health professional programs - medical students believe that clinical work should be the responsibility of individuals, nursing students have a collective view and believe that work should be systemized and pharmacy students are at a mid-point in this continuum |
| Linn et al. (1986) | Evaluation of physician attitudes to PCC | USA—AHPs and patients | Non-physician staff members and patients evaluated 71 IMRs and 16 faculty members who provided outpatient care. The goal was to evaluate the humanistic qualities of physicians. | - Evaluation form with 18 items | - Non-physician staff were generally very satisfied with the humanistic characteristics of residents and faculty - patients rated staff members less favorably than IMRs |
| Hall et al. (2015) | Evaluation of physician and allied health attitudes to PCC Tools to evaluate PCC | USA—nursing students, medical students, IMRs, undergraduate students | Test of Accurate Perception of Patients’ Affect (TAPPA) was designed to explore the accuracy of understanding patients’ thoughts and feelings. Participants took the test on videorecordings of patients during actual medical visits. Participant accuracy scores were then correlated with their attitudes toward PCC, course background, recall of clinical conversation, evaluations of performance by preceptors and standardized patients (SPs) | - Correlation of participants’ accuracy scores and attitudes - independent coding of participant behavior in a clinical encounter | - Accuracy was significantly correlated with nursing students’ course experience, clinicians’ favorable attitudes to psychosocial discussion, SPs’ evaluations of medical students’ interpersonal skill, independent coding of medical students’ patient-centered behavior while taking a social history, and undergraduates’ more accurate recall of what an actor-physician said on video |
| Zandbelt et al. (2005); Zandbelt et al. (2006); Zandbelt et al. (2007a, 2007b) | Evaluation of physician attitudes to PCC | Netherlands—IMRs and IM specialists (n = 30) and their patients (n = 323) | Patients were surveyed to determine the impact of physicians’ patient-centered communication on patient satisfaction, adherence, and health status. Specialists’ patient-centered communication was assessed by coding behaviors that facilitate or inhibit patient perspectives. Patient participation was assessed by determining their relative contribution to the conversation and their active participation behavior. | - Physician and patient questionnaire followed by a videotaped consultation to assess patient satisfaction - patient self-reported treatment adherence, symptoms and distress 2 weeks later - consultations coded using the Patient-centered Behavior Coding Instrument (PBCI) | - Physicians displayed more facilitating behavior when patients were older, reported more physical symptoms, rated patients’ health condition as more severe and when the physician was female - physicians displayed more inhibiting behavior when patients reported more physical symptoms and when the physician rated patients’ health condition as more severe. - patients were more satisfied after encountering a more-facilitating and less-inhibiting physician, but the effects diminished when controlling for background characteristics - facilitating behavior was positively related to adherence in patients with a foreign primary language - physicians’ facilitating behavior was positively associated with patients’ relative contribution to the conversation and active participation behavior |

Table 1 (continued)

| Article | Assigned category | Country of publication—study population | Study design | Evaluation methods | Conclusions |
|---------------------------|--|--|---|--|---|
| Reid et al. (2006) | Tools to evaluate PCC Evaluation of physician and allied health attitudes to IPC | UK—general practitioners, nurses, pharmacists and AHPs | The Readiness for Interprofessional Learning Scale (RIPLS) questionnaire was validated to assess health professionals' attitudes towards IPE at the practice, community and national level | - 546 responses to the RIPLS questionnaire | - analysis of variance suggested key differences between the different professions in respect to teamwork and collaboration, sense of professional identity and patient-centredness |
| Friary et al. (2018) | Evaluation of allied health attitudes to PCC | New Zealand—six SLP students, eight PT students, and two clinical educators | Phenomenological study in a university clinic-based IP program for five clients living in the community with Parkinson's Disease. | - Collaborative hermeneutic analysis of client interviews and student and clinical educator focus groups held immediately after the program | - Client self-management and empowerment can allow for a better client and student educational experience - students need ongoing opportunities to share explicit understandings of IPC and dispel assumptions, since isolated IP experiences may not be enough |
| Blondon et al. (2017) | Evaluation of physician and allied health attitudes to IPC | Switzerland - IMRs and IM nurses | Mixed-methods study exploring resident-nurse collaborative reasoning in a simulation setting. 14 IM resident-nurse teams each managed an acute case scenario, followed by a stimulated-recall session. Three investigators (two physicians, one nurse) assessed performances and extracted elements supporting the collaborative reasoning process. | - investigators scored individual and team performances on a five-point Likert scale - qualitative, inductive analysis of transcripts - quantitative analysis done | - qualitative results underlined need to improve situational awareness - IMRs and nurses differed in reasoning processes - themes of collaborative reasoning include diagnostic reasoning, patient management, patient monitoring, communication with the patient, and team communication. |
| Wong et al. (2016) | Evaluation of physician and allied health attitudes to IPC | USA—medical, nursing and physician associate students | Health professional students in an inter-professional education (IPE) curriculum were surveyed in their 1 st and 3 rd years with a goal to understand characteristics, demographics and experiences associated with positive attitudes towards IPE. | - Readiness for Interprofessional Learning Scale (RIPLS) - Interdisciplinary Education Perception Scale (IEPS) - survey of demographics, prior degrees and healthcare experience | - Health professional students differ in attitudes towards IPE - positive attitudes were associated with being a nursing student, female, older, and having more previous healthcare experience - students who participated in IP extracurricular activities during their degree reported more positive attitudes |
| Norris et al. (2015) | Evaluation of physician and allied health attitudes to IPC Evaluation of physician and allied health attitudes to PCC | USA—nursing, pharmacy and medicine undergraduate and graduate students | The Interprofessional Attitudes Scale (IPAS) was created to better reflect current thinking about interprofessional competencies. Electronic surveys were emailed to 1549 undergraduate and graduate students. | - 27-item scale, with subscales in teamwork, roles and responsibilities, patient-centeredness, IP biases, diversity and ethics and community-centeredness | - High scores given for 'establishing trust with patients' and 'communicating compassion to patients' - high scores for "health professionals/students from other disciplines have prejudices or make assumptions about me because of the discipline I am studying" |
| Edwards et al. (2015) | Evaluation of physician and allied health attitudes to IPC | USA—PCPs and primary care staff including registered nurses (RNs), licensed practical/vocational nurses (LPNs) and medical assistants/clerks (MAs) | Cross-sectional survey of 162 PCPs and 257 primary care staff in 23 primary care practices to assess perceived task allocation during implementation of a new patient-centered care model. Subjects were asked if PCPs performed 14 common tasks alone or relied on staff for help. | Multivariable regression to determine predictors of perceived PCP reliance on staff for each task. | - Most PCPs perceived they were solely responsible for most clinical tasks whereas RNs, and LPNs felt they were relied upon for most of the same tasks, while medical assistants/clerks reported being relied on for fewer tasks. - better understanding of optimal IP task allocation is needed |
| Muller-Juge et al. (2014) | Evaluation of physician and allied health attitudes to IPC | Switzerland—IMRs and IM nurses | Simulated IM ward where 14 pairs of IMRs and nurses managed one non-urgent and one urgent clinical case using a high-fidelity manikin. The aim was to describe behaviors contributing to quality of teamwork | - Post-simulation recall session to view videotape and discuss actions and perceptions - Qualitative template analysis and coding | - Most IMRs and nurses interacted traditionally with IMRs taking on the leadership role and nurses executing - Others demonstrated readiness for increased sharing of responsibilities, |

Table 1 (continued)

| Article | Assigned category | Country of publication—study population | Study design | Evaluation methods | Conclusions |
|--------------------------------|--|--|--|--|---|
| Hutchings et al. (2012) | Evaluation of allied health attitudes to PCC | UK—community nurses, newly qualifying nurses, nursing stakeholders and members of the public | Mixed methods study to explore what ‘patient-centered professionalism’ means to those working in healthcare settings and develop a ranked thematic list of positive and challenging examples of PCC in community nursing. | - 5 consultation workshops with 34 participants - adapted Nominal Group Work approach to develop ranked thematic lists | mutual listening, information sharing, and positive team building - Each of the five workshops resulted in the production of ten positive and ten challenging exemplars of PCC |
| Miller et al. (2008) | Evaluation of physician and allied health attitudes to IPC | Canada—full- and part-time nurses, medical professionals and AHPs across all licensure and managerial levels on GIM wards | This is a qualitative study to examine nursing IPC and emotion work (management of the emotions of self and others to improve PCC) with a goal to better understand and improve collaborative nursing practice. | - Qualitative data was collected using non-participant observation, shadowing and semi-structured interviews | - Nurses’ collaborations with other professionals are influenced by emotion work considerations - failure of the interdisciplinary team to acknowledge nursing’s core values plays an important role in their IP disengagement |
| Suhonen et al. (2007) | Evaluation of allied health attitudes to PCC | Finland —hospitalized adult patients recruited pre-discharge from surgical, gynecological and IM units | A cross-sectional correlational survey of 861 pre-discharged hospitalized patients was done to examine predicted relationships between individualized care and patient satisfaction, autonomy and quality of life. | - Patient score data was used to test a proposed model (LISREL) | - Individualized nursing care contributes to positive patient outcomes - the proposed model linked individualized nursing care directly to positive patient outcomes |
| Rao et al. (2006) | Evaluation of physician and allied health attitudes to PCC | India—patients at primary health centers, community health centers, district hospitals, and female district hospitals | Cross-sectional survey of health facilities and patients to identify aspects of perceived quality which have large effects on patient satisfaction and to develop a reliable and valid scale to measure in-patient and outpatient perceptions of quality | - A 16-item reliable and valid scale was developed - five dimensions of perceived quality were | - For outpatients, doctor behavior has the largest effect on patient satisfaction followed by medicine availability, hospital infra- structure, staff behavior, and medical information. - for in-patients, staff behavior has the largest effect followed by the other dimensions |
| Curran et al. (2005) | Evaluation of physician and allied health attitudes to IPC | Canada—academic administrators representing medicine, nursing, pharmacy, SW, PT and OT post-secondary educational programs | Questionnaires completed by academic administrators were used to examine attitudes towards IPC and IPE as well as opinions regarding barriers to IPE | - Web-based questionnaire in English and French was distributed via e-mail | - Academic administrators hold overall positive attitudes towards IPC and IPE with no significant differences between professions - barriers include scheduling, rigid curriculum, turf battles and lack of perceived value |
| Paasche-Orlow and Roter (2003) | Evaluation of physician attitudes to PCC | USA - full time community-based Internal Medicine (IM) and Family Practice (FP) physicians | 277 clinical encounters with 29 FP physicians and 287 clinical encounters with 30 IM physicians were audiotaped and analyzed to reflect data gathering, patient education and counseling, rapport building, partnership building, verbal dominance and patient-centeredness. | - communication was evaluated with the Roter Interaction Analysis System - patient satisfaction was measured with an exit questionnaire | - IM clinicians asked more biomedical questions and FP clinicians engaged in more psychosocial and emotionally supportive discussions - FP physicians were more verbally dominant with female patients and more patient-centered with minority patients |
| Nelson (2000) | Evaluation of physician and allied health attitudes to PCC | USA - 3165 patients from 70 internal medicine offices drawn from the National Database on Patient-Centered Care | An exploratory analysis of patient self-reported data was conducted using parametric and non-parametric techniques to identify factors in the office setting that are associated with patient satisfaction. | - data were collected via the ACP Patient-Centered Care Questionnaire - a model was created using multiple regression techniques | - factors that independently predicted patient satisfaction included the physician’s clinical and interpersonal skill, the interpersonal skill of the office staff, physician information giving, and coordination of care |

Categories have been assigned to reviewed papers. Categories were not predetermined but discerned after a round of review.

Table 2 Intervention-based publications (n = 36).

| Authors | Assigned category | Country - study population | Intervention | Evaluation of intervention | Outcome |
|---------------------------------|---|--|--|--|--|
| Byrne et al. (2013) | PCC real-time intervention IMR attitudes to PCC | USA - IMRs | Veterans Affairs (VA) national patient-centered care initiative organized primary care into interdisciplinary teams to provide patient-centered, continuous, coordinated care in continuity clinics, university setting or county hospitals. The most senior ward-based professionals on each ward received one-on-one training and then acted as ward intervention leaders for their profession. The intervention promoted self-introduction by role and profession to a collaborating colleague in relation to the shared patient, a question or communication regarding the patient, to be followed by an explicit request for feedback from the partner professional. | - Learners' Perceptions Survey—Primary Care (LPS-PC) to demonstrate discriminate validity to assess IMR perceptions of primary and PCC experiences - qualitative methods including ethnographic observations, interviews and documentary data | - faculty and preceptors, physical, and learning environments had more impact on overall resident satisfaction than patient- and family-centered care. - intervention did not produce anticipated changes in IP communication and collaboration - senior physicians, nurses, AHPs minimally explained the intervention to junior colleagues and rarely role-modeled - barriers included professional resistance, a fast paced, interruptive environment, rare and impersonal IP communication and absence of continued senior clinician and management support |
| Rice et al. (2010) | Non-IMR IPC real-time intervention Non-IMR attitudes to IPC | Canada - IP teams on general internal medicine wards | | | |
| Maatouk-Bürmann et al. (2016) | PCC simulated intervention | IMRs and IM physicians (total 42) | Communications training intervention (6 weeks) to teach interview techniques that promote PCC. Sessions include role play (15 standardized roles) with and without simulated patients and video and immediate feedback. Comprised 26 sessions (45 min each) followed by feedback during a supervised ward round (2h) and final training day (8 sessions). | - randomized controlled trial - Roter Interaction Analysis System (RAIS) over 3 months in a primary care clinic. Score <1 indicates conversation focused on biomedical issues, score >1 indicates emphasis on patient-related content. | |
| Meade et al. (2015) | PCC real-time intervention IPC real-time intervention | USA - IMRs | TRANSITION of Care Rotation (TRACER) (2-weeks) is a mandatory rotation based on self-reflection and workplace learning where IMRs join a ward team as a quality officer and follow patients into post-acute care | - semi-structured, one-on-one interviews grounded theory analysis: transcripts were coded into themes | - TRACER introduced IMRs to IPC and transition care - IMR identified themes include 'seeing things from the other side, the 'ah ha' moment of fragmented care, team collaboration including understanding nursing scope of practice in different settings, patient understanding, and passing the learning on' - curriculum was highly rated by IMRs (6.86 on a 9-point scale) and was associated with a significant increase in the rating of transitional care education (from 4.09 to 4.53 on a 5-point scale) - learners reported improved knowledge in key curricular areas and believed the curriculum would influence practice changes |
| Schoenborn and Christmas (2013) | PCC real-time intervention IPC real-time intervention Use of narrative reflection | USA - Year 1 IMRs | 2-week mandatory curriculum involving teachers from geriatric medicine, physical, occupational, and speech therapy, and home health care to teach IMRs how to provide better transitional care at hospital discharge through both didactic and experiential components and self-reflective exercises. Non-acute care settings including post-acute care facilities, home health care and outpatient clinics. | - annual residency program survey - self-reflective exercises | |

Table 2 (continued)

| Authors | Assigned category | Country - study population | Intervention | Evaluation of intervention | Outcome |
|---|---|---|---|---|---|
| Ratanawongsa et al. (2012) | PCC real-time intervention | USA - IMRs (Aliiki initiative) | Modified IM team structure - one inpatient team admitted half census and engaged in a multimodal PCC curriculum to promote patients as individuals, improve transitions of care, reduce barriers to medication adherence. Teams comprised one resident, two interns, two medical students, a faculty attending, and a nurse case manager. | <ul style="list-style-type: none"> - online IMR post-rotation evaluation of intervention and standard inpatient rotations on a 9-point scale - post-discharge survey of patients | <ul style="list-style-type: none"> - intervention was judged as professionally valuable (90%) and important to training (90%) - intervention team received significant higher ratings for addressing medication adherence, patient communication about transition of care, and knowing patients as people. - patients from intervention team reported significant greater satisfaction with physicians than patients on standard teams |
| Record et al. (2011) | PCC real-time intervention | USA - IMRs (Aliiki initiative) | A patient-centered, transition-focused curriculum for GIM inpatient teams with mandatory medication adherence assessment, telephone calls to outpatient providers and a telephone call to each patient after discharge as well as home/facility visits for select patients after discharge | Retrospective, quasi-experimental study design and time-to-event analysis assessing death or readmission for heart failure within 30 days of hospital discharge | <ul style="list-style-type: none"> - only 4% of patients in the intervention team died or were readmitted for heart failure compared with 14% on standard teaching teams (P = 0.04) - rate of death or re-admission for any diagnosis within 30 days was 25% for the intervention team versus 32% for standard teams (P = 0.34) |
| Espada et al. (2015) | PCC real-time intervention | USA - IMRs | Mentored home hospice visit to teach IMRs to effectively describe and recommend hospice. IMRs on the Geriatric rotation were randomized to standard curriculum or standard curriculum plus half day of supervised home visits with a hospice team. | <ul style="list-style-type: none"> - Post-intervention OSCE to test ability to discuss prognosis and recommend hospice | <ul style="list-style-type: none"> - IMRs who participated in the hospice home visit experience showed a trend towards significant increase in recommending hospice and describing the provision of bereavement care to appropriate patients |
| McMahon et al., (2010); Hanyok et al., (2012) | PCC real-time intervention Use of narrative reflection | USA - IMRs (Aliiki initiative) Trainee team comprised two residents (postgraduate year 2 or 3) and three medical interns (postgraduate year 1) | Experimental inpatient IM service with reduced resident workload and increased opportunities for PCC The Johns Hopkins Aliki Initiative is a 4-week patient-centered, transition-focused curriculum for GIM inpatient teams with mandatory medication adherence assessment, telephone calls to outpatient providers and a telephone call to each patient after discharge as well as home/facility visits for select patients after discharge. Includes narrative reflection exercises, evidence-based articles, patient education handouts, instruments for formative and summative evaluation of patient-centered skills and monthly conferences sharing illustrative home visit videos. | <ul style="list-style-type: none"> - Faculty observe IMRs and evaluate with online MiniCEX twice a week - The Challenging Provider-Patient Relationship: Reflection Exercise - Narrative reflection using template | <ul style="list-style-type: none"> - educationally driven IM service with decreased resident workload, increased resident supervision and multidisciplinary teams was associated with increase in time spent in educational activities and increased trainee satisfaction without having a negative effect on the quality of care - patient satisfaction was the same |
| Block et al. (2017) | | USA - 179 IMRs | Patient-centered medical home (PCMH) curriculum for IMRs in three residency | Mixed-methods study including a cross-sectional survey of 179 IMRs; 52% cared | <ul style="list-style-type: none"> - IMRs trained at PCMH sites were more likely to engage in quality care domains |

Table 2 (continued)

| Authors | Assigned category | Country - study population | Intervention | Evaluation of intervention | Outcome |
|------------------------|---|---|--|--|---|
| | PCC real-time intervention | | <p>The primary outcome was resident-reported performance of PCMH tasks derived from PCMH EPAs and secondary outcomes included self-reported learning and teaching, collaboration with the multi-disciplinary team, and satisfaction with the clinic.</p> <p>Two courses on patient- and family-centered care (PFCC) incorporated into Medical School curriculum: a longitudinal course that includes patient-student partnerships and home visits and another longitudinal clinical experience course with didactic education, a focus on stories, patients and families as mentors and volunteer patient-family advisors (VPFAs) as discussion facilitators</p> | <p>for patients at PCMH sites</p> <ul style="list-style-type: none"> - nominal group analysis of faculty, staff and IMRs at one site | <ul style="list-style-type: none"> - they did not report higher satisfaction with ambulatory clinic and were not more likely to report performing tasks in the domain of measuring and improving performance - similar facilitators and barriers to PCC were cited regardless of PCMH status. |
| Parent et al. (2016) | Non-IMR PCC real-time intervention Use of narrative reflection | USA - Year 1 medical students | <p>patient- and family-centered care (PFCC) incorporated into course that includes patient-student partnerships and home visits and another longitudinal clinical experience course with didactic education, a focus on stories, patients and families as mentors and volunteer patient-family advisors (VPFAs) as discussion facilitators</p> | <p>Student essays and impressions assessing students at the end of each term with respect to their skill in communication, patient care, knowledge, and participation surrounding socio-behavioral topics and are exploring the engagement of VPFAs as part of the evaluation process.</p> | <ul style="list-style-type: none"> - students reported increased understanding of the principles of PFCC - VPFAs can educate through their experiences - education should be centered on personal stories and reflection as a foundation for empathic relationships - PFCC education must be continued throughout medical education for true change to be sustained |
| Sordahl et al. (2018) | IPC simulated intervention | USA - IMRs (year 2-3), nurse practitioner students/residents, nursing students, clinical psychology interns, postdoctoral fellows and ambulatory pharmacy residents - (USA) | <p>Interprofessional case conference (1 h) with patient-centric case based discussions to discuss high risk patients, create a multidisciplinary care plan and increase knowledge of AHP roles</p> | <ul style="list-style-type: none"> - self-reported questionnaire with Likert-scale - evaluation of number of electronic medical record consults before and after intervention | <ul style="list-style-type: none"> - trainee behavioral change measured by consult patterns - increased awareness of allied health roles - improved IP collaboration |
| Janssen et al. (2017) | IPC simulated intervention | Netherlands - 12 IMRs (year 4-6), 3 IM physicians, 8 GPs, 40 family medicine residents (year 3) | <p>Supervised consultation program for residents to learn how to ask for and provide consultation advice and explore IPC based educational activities</p> | <ul style="list-style-type: none"> - focus groups with trainees and supervisors/mentors | <ul style="list-style-type: none"> - trainees reported consultation and collaboration skills they could not have gained otherwise and improved understanding of other specialty - interaction was key factor in learning process |
| Gupte et al. (2016) | IPC simulated IMR attitudes to IPC | USA - 90 IMRs and 33 Masters of Public Health (MPH) students - (USA) | <p>16-week QI curriculum with a monthly group meeting (90 min) for learning on QI topics and project work</p> | <ul style="list-style-type: none"> - pre- and post-curriculum surveys | <ul style="list-style-type: none"> - improved resident attitudes toward learning and engaging in QI work - MPH students demonstrated significantly more positive attitudes about IP learning and work than residents - MPH students agreed more strongly than residents that patients would benefit from this collaboration |
| Nothelle et al. (2015) | IPC simulated intervention | USA - IMRs, faculty, medical students and 15 non-physician professionals | <p>"Guess My Role" game (1h) to teach IMRs about the roles of 15 non-physician professionals. Participants ask 10 yes/no questions to guess profession followed by AHP profession summary</p> | <ul style="list-style-type: none"> - 33 participants completed a pretest, 25 completed a post-test after the intervention | <ul style="list-style-type: none"> - enthusiastic participation and positive comments - statistically significant improvement in knowledge of non-physician roles (mean score of 56 points versus 52 points; P = 0.014) - nonsignificant trends favoring higher scores with higher levels of training. |

Table 2 (continued)

| Authors | Assigned category | Country - study population | Intervention | Evaluation of intervention | Outcome |
|-------------------------------|---|---|--|---|--|
| Kowitlawakul et al. (2014) | IPC simulated intervention | Singapore - Year 1 IMRs, advanced practice nurse (APN) trainees, nursing and medicine faculty | Simulation-based semester-long interprofessional education (IPE) program with high-fidelity simulations of 4 medical emergencies. Trainee APNs attended all 4 sessions, IMRs attended one each. | - validated Likert scaled surveys and written comments - open-ended question answers analyzed with Colaizzi's method | - high learner satisfaction with strongly positive attitudes toward teamwork, collaboration and patient centredness. - IPE scenarios greatly aided understanding of professional scope and boundaries of APNs |
| Hemming et al. (2016a, 2016b) | IPC real-time intervention | USA - IMRs and Chaplain interns | Interprofessional team based curriculum (4 weeks) where chaplain interns spent 1 day per week rounding with IM team, teaching their role and discussing spirituality with patients. Phases included orienting, rounding and partnering. | - focus groups including IMRs, chaplain interns and IM attendings with qualitative analysis of transcripts | - Chaplain interns provided enhanced patient-centered care amongst IMRs. - Intervention rotations received significantly higher ratings than standard rotations in understanding patient values and IPC with chaplains. - This curriculum incorporated spirituality in IM training; there was a 36% increase in IMRs comfortable with discussing spirituality with patients. |
| Nabors et al. (2011) | IPC simulated intervention PCC simulated intervention | USA—Year 1-3 IMRs | Administrative internship curriculum to provide systems-based practice training as part of an annual 4-week ambulatory block involving close interactions with non-physician staff with rotations in case management (8 h), inpatient and outpatient nutrition (12 h each), inpatient and continuous quality improvement (20 h each), billing and coding (4 h), risk management (20 h), occupational health (12 h) and pharmacy (20 h) | - Verbal feedback, end-of-rotation written assessments, written and oral examinations, written systems-based practice test (pre-AI and post-AI), and program ratings of quality improvement portfolios. - tracked systems-based practice metrics for IMRs including compliance with core health care measures, length of stay and patient satisfaction | - IMRs recognized the need to develop systems-based practice skills, to readily participate in structured curricula designed to enhance such skills, and to provide leadership in organizing and publishing quality improvement initiatives - graduates may lament that they did not receive even more vigorous training in these areas - IMRs need and want systems-based practice skills during their training - a comprehensive systems-based curriculum in IM training is possible and beneficial - Without institutional support creating such a curriculum can be challenging -Residents believed that team-based care improves continuity and quality of care but did not see it as intrinsically educational - a culture of ultimate resident responsibility negatively impacted team-based care - including residents in IP teams may not be enough to teach the impact of team-based care on their practice |
| Soones et al. (2015) | IPC real-time intervention IMR attitudes to IPC | USA—182 IMRs (Year 1-3) | Interprofessional team based care model with monthly team meetings and continuous quality improvement targets | - Qualitative interviews and focus groups - transcripts coded into themes using inductive approach | - Residents believed that team-based care improves continuity and quality of care but did not see it as intrinsically educational - a culture of ultimate resident responsibility negatively impacted team-based care - including residents in IP teams may not be enough to teach the impact of team-based care on their practice |
| Hanyok et al. (2013) | IPC simulated intervention IPC real-time | USA - 20 IMRs and 18 nurse practitioner students | Longitudinal interprofessional education (IPE) experience (1 month) comprising didactic learning (three 90-min classroom sessions) and collaborative patient care through clinic and home visits | - Interprofessional Attitudes and Practice Survey (IAPS), comprising open ended questions and a 21-item, 5-point Likert scale. | - significant improvements in attitudes and beliefs regarding IPC and AHP roles. - did not influence attitudes and beliefs towards effects of IP education on patient outcomes |

Table 2 (continued)

| Authors | Assigned category | Country - study population | Intervention | Evaluation of intervention | Outcome |
|-------------------------|--|---|--|--|---|
| Dellasega et al. (2007) | Non-IMR PCC simulated intervention Use of narrative reflections | USA - medical and nursing students | A medical school curriculum was innovated that included a humanities elective taken jointly by medical and nursing students. Courses include Medicine and Madness, Death and Dying in Literature, Arts and Healing where students can use writing and art as a springboard to discuss key issues related to their shared practice Over 2 years, pilot programs were also designed to promote interdisciplinary experiences for graduate and undergraduate nurses, medical students, residents, and faculty, each involving a creative, humanistic component. | <ul style="list-style-type: none"> - commentaries on the degree and quality of nurse/ physician collaboration were presented in class and as a final paper along with an action plan - during a joint retreat written evaluations were completed | <ul style="list-style-type: none"> - both nurses and physicians were motivated to collaborate more rather than less - an external curriculum review of graduate nursing and medical education programs revealed few courses that reflect humanities content |
| King et al. (2017) | Non-IMR PCC simulated intervention Use of narrative reflection | USA - Year 1-3 pharmacy students | Narrative reflections as part of a 3-year pharmacy curriculum where students use the "What, So What, Now What" format to write 18 reflections within five didactic and six experiential courses. Goal to assess student perceptions of reflective writing's value and impact on their professional development | <ul style="list-style-type: none"> - Reflection papers graded by course coordinator using Grading Rubric - survey and course evaluation questions regarding perceptions of the impact of reflective writing | <ul style="list-style-type: none"> - most students found some value in reflective writing but only 42% thought it had an appreciable or significant impact on professional development - Most students indicated a positive impact on sensitivity to specific patient populations, ethical behavior, interpersonal skills, and patient-centered, inter-professional care. - creative experiential reflection and critical thinking foster personal knowing and professional development, but formal evaluation is needed |
| Schwind et al. (2014) | Non-IMR PCC simulated intervention Use of narrative reflections | Canada - nursing students | Faculty used creative approaches such as reflection and group expression, esthetic reflection to foster a sense of connection with another, experiential teaching-learning narrative reflective processes, fostering PCC through arts | <ul style="list-style-type: none"> - student feedback on faculty and course evaluations | <ul style="list-style-type: none"> - Students gained insights into their aspirations to provide PCC and a recognition of the emotional nature of their work; the need to rise above negative cultures, challenging outdated practices and strengthening professional identity |
| Hanson (2013) | Non-IMR PCC simulated intervention Use of narrative reflections | Australia—nursing students | Values-based learning activity using extracts from a book that conveyed uncertainty and insecurity experienced and overcome by a novice intensive care nurse followed by transformative learning questions to promote reflection | <ul style="list-style-type: none"> - Focus group - stages of affective learning was used to evaluate the activity | <ul style="list-style-type: none"> - Majority of participants reported high likelihood to implement learnt strategies - For IM, changing the balance of inpatient and outpatient care was especially hard - Highlighted importance of self-reflection in providing PCC |
| Carney et al. (2015) | Non-IMR PCC simulated intervention | USA—36 family medicine, IM, pediatric faculty members from 12 residencies in four locations | Interdisciplinary Primary Care Faculty Development Initiative to teach faculty change management, leadership, population management and competency assessment in residency training using didactic and small group interactive sessions. | <ul style="list-style-type: none"> - Participant surveys on usefulness of sessions and intention to implement redesign features - content analysis to identify themes | <ul style="list-style-type: none"> - For IM, changing the balance of inpatient and outpatient care was especially hard - Highlighted importance of self-reflection in providing PCC |

Table 2 (continued)

| Authors | Assigned category | Country - study population | Intervention | Evaluation of intervention | Outcome |
|------------------------------------|--|--|---|---|--|
| Lo et al. (2017) | IPC real-time intervention | USA—43 IMRs and 69 IM interns | Inpatient Interprofessional Patient Aligned Care Team (iPACT) with designated work space for shared work and learning in IM teams | - Program evaluation survey - 1-on-1 interviews with residents and faculty | - 70% of respondents preferred iPACT over non-iPACT IM teams - iPACT workshop eliminates IP communication barriers |
| Nawaz et al. (2015) | IPC simulated intervention IPC real-time intervention | USA—10 preventive IM residents | 4-year combined internal medicine/preventive medicine program with collaboration with integrative medicine practitioners in interdisciplinary teams to provide holistic patient care using didactics, grand rounds, journal club, OSCE and integrative medicine clinical rotations. | - 2-year prospective observational study - resident self assessment using Complementary, Alternative, and Integrative Medicine Attitudes Questionnaire | - Demonstrated high need for integrative medicine training - improved resident attitude towards complementary and Alternative Medicine (CAM) |
| Eiser and Connaughton-Storey, 2008 | IPC simulated intervention | USA—Year 1 IMRs | Two-week supervised workshop in systems-based practice to give IMRs firsthand experience with non-physician providers including home care services, hospice care, pharmacy services, laboratory services, utilization services, and nutrition services. | - IMR surveys pre- and post- workshop | - IMRs reported improved awareness of other disciplines, both conceptual understanding and policy knowledge - post-intervention, non-physician providers noted subjectively more appropriate use of services |
| Vogwill (2008) | IPC real-time intervention | Canada (graduate thesis) - nurses, IMRs, physicians on a GIM ward | A process engineering intervention to target information exchange gaps between health professionals in daily multidisciplinary 'Bullet rounds' | - Pre- and post-intervention analysis of Bullet Rounds | - Information loss decreased post-intervention - IMRs were not satisfied with nurses-physician information exchange - nurses felt the process had improved but needed revisiting - nurses were not aligned with staff physicians on respective roles and responsibilities - Improved perceived comfort and ability to work with others - subscales of value in working with others improved over time but not statistically significant |
| Zook et al. (2018) | Non-IMR IPC simulated intervention | USA—graduate students in nursing, psychology, speech language pathology | Interprofessional education (IPE) curriculum over 3 semesters for nursing, psychology, SLP graduate students including modules, unfolding case studies, virtual simulation, and shared case planning experiences. | - Interprofessional Socialization and Valuing Scale (ISVS) is a 24-item self-report tool on a Likert scale - pre- and post-test | - Significant increase in post-intervention scores for role clarification and PCC domains as well as increased scores for team functioning, collaborative leadership, and communication domains - IP curriculum improves collaborative practice among internationally educated health professionals in Canada |
| Arain et al. (2017) | Non-IMR PCC simulated intervention Non-IMR IPC simulated intervention | Canada—Internationally Educated Health Professionals (IEHPs) - nurses, pharmacists, physicians, OT, PT | Online interprofessional education curriculum designed to cover the six interprofessional competency domains defined in the Canadian Interprofessional Health Collaborative Framework. Thirty IEHPs and five educators reviewed the curriculum. | Surveys, interviews, pre- and post- self-assessment tool and reflective questions | - Perceived benefits of interprofessional clinical placements and improved attitudes towards healthcare teams - significantly higher group scores for geriatric and palliative care teams |
| Grymonpre et al. (2016) | Non-IMR IPC real-time intervention | Canada—multidisciplinary teams on four clinical units - geriatric, palliative, orthopedic, internal medicine | Multifaceted intervention including IP team mentorship model and IPC training in interpersonal and communication skills (including conflict resolution), patient-centered and family focused care, and collaborative practice | - Written quantitative and open-ended question survey - repeated time analysis and multivariate analysis of variance | - Perceived benefits of interprofessional clinical placements and improved attitudes towards healthcare teams - significantly higher group scores for geriatric and palliative care teams |

Table 2 (continued)

| Authors | Assigned category | Country - study population | Intervention | Evaluation of intervention | Outcome |
|------------------------|------------------------------------|---|--|--|--|
| Stagno et al. (2016) | Non-IMR PCC simulated intervention | USA—11 participants | 90-min workshop with three approaches to PCC: a video of a patient sharing her experience within the health system, a narrative first-person memoir of appreciating patient experience and an exercise of using patient-centered language in medical record documentation | Feedback was received from 11 participants | - High degree of agreement that the workshop advanced knowledge and provide a useful starting point for hearing and appreciating the experience of the patient |
| Baessler et al. (2016) | Non-IMR IPC simulated intervention | USA—graduate students in 8 programs; medicine, nursing, OT, PT, RT, SLP, pharmacy and physician assistant studies | A pilot course integrated IPE into the first-year curricula of eight professional health care programs using interactive workshops, hands-on vital sign skills, interviewing standardized patients, identifying simulated safety hazards and recognizing roles and responsibilities through service-learning opportunities | - Groups discussions | - Nursing learners identified three major themes to represent the education they acquired from participating |

Categories were assigned to reviewed papers. Categories were not predetermined but discerned after a round of review.

combination of questionnaires/surveys, focus groups, one-on-one interviews, pre- and post-tests, objective structural clinical examinations (OSCEs), primary outcome assessments and ethnographic analysis. When coding categories, in addition to categories for IPC or PCC simulated or real-time interventions, we also assigned categories for IMR or non-IMR attitudes to IPC/PCC if these were revealed during an intervention. An additional category was assigned for the use of narrative reflective practice as an intervention; only 2 such interventions were identified for IMRs and 5 for non-IMRs.

Table 3 summarizes 29 articles, reviews, opinions, personal views, reflections, perspectives, commentaries and best practice guidelines that discussed a need for system-based change and/or PCC/IPC curriculum change in medical education. Three of these described a need for narrative reflective practice in curricula.

Discussion

The Institute of Medicine’s 2001 report strongly advocated for adoption of PCC (Institute of Medicine Committee on Quality of Health Care in America, 2001) but changes in clinical practice and medical education reform have been slow. We undertook this study to explore the attitudes of physicians and learners towards PCC and IPC and to catalog educational interventions designed to promote these skills in medical education and training. Our review finds concerning trends in attitudes based on professional cultures (Table 1). Physicians think of PCC as an individualized approach to care with a focus on systematic evidence and objective knowledge to improve care (Smith et al., 2015; Sidani et al., 2018). In contrast, nurses and other allied staff perceive it as a team approach with a focus on patient experiences and developing therapeutic relationships (Smith et al., 2015; Sidani et al., 2018). This significant difference may underlie many physician-related barriers to IPC including lack of patient centered communication, team engagement, and inclusion of patients, families and other team members in decision-making. Overall, physicians appear to value PCC less than other allied health staff (Gachoud et al., 2012). Alarming,ly, this trend was noted even amongst medical students and residents who appear to value IPC and PCC learning significantly less than non-physician counterparts with a lack of improvement in attitudes as training progressed (Kashner et al., 2017). In fact, IMRs in a PCC initiative reported that the physical and learning environment had more impact on their satisfaction than practicing patient- and family-centered care (Byrne et al., 2013).

Physician overconfidence in PCC skills can affect attitude to learning.

Physicians’ negative attitudes and misperceptions regarding PCC likely influence their perception of need for such training (Table 1). Sidani et al. (2016) showed that physicians rated their PCC abilities higher than their patients’ ratings of their skills (Sidani et al., 2016). In an ethnographic study in a cardiology clinic, patients found it difficult to understand and participate in decision-making and indicated that physicians lacked skills related to the non-medical aspects of their diagnosis (Thrysoee et al., 2018), potentially because physicians focus more on the biomedical aspects of their patient’s care than on psychosocial domains (Weiner et al., 2007). Physicians probed fewer contextual (51%) than biomedical (63%) hints during patient interviews (Weiner et al., 2010). IMRs and physicians are overconfident in their own PCC skills but in reality, lack the necessary knowledge and communication skills. They inadvertently develop negative attitudes and perceptions regarding this type of learning and therefore, view them as less valuable. These misperceptions must be explicitly corrected; PCC curricula must clearly demonstrate the need for teamwork and create appreciation for

Table 3 Articles, reviews, opinions, personal views, reflections, perspectives, commentaries and best practice guidelines reflecting a need for curriculum and system-based changes (n = 29).

| Article | Publication type (country) Category assigned | Premise |
|--------------------------------|--|--|
| Doolittle et al. (2015) | Article (USA) Need for PCC curriculum changes Need for IPC curriculum changes | The authors provide background on the Patient-centered Medical Home (PCMH) model; a team-based approach to primary care by physicians, mid-level providers, nurses and AHPs. They discuss challenges in implementing the PCMH model in physician training programs (institutional commitment, infrastructure expenditures and faculty training), present the preliminary success of a pilot project (improvements in quality measures, emergency room visits and cost savings) and propose a strategy for implementation at other institutions. |
| Lown et al. (2016) | Perspective (USA) Need for PCC curriculum changes | The authors lament that values and skills related to providing compassionate, collaborative care (CCC) are not routinely taught, modeled and assessed in health professional education, postgraduate training and clinical care. They discuss how the CCC framework can be integrated into competency standards and discuss strategies to collaborate with patients and families to ensure person-centered, relationship-based high-quality care. |
| Orchard et al. (2005) | Article (Canada) Need for IPC curriculum changes | The authors propose a client-centered collaborative professional practice model to promote interdisciplinary collaborative practice (IDCP) amongst healthcare professionals by identifying barriers and enablers. Barriers to IDCP include organizational structure, power imbalances amongst health care professionals and with their clients and role socialization into health disciplines. Enablers include role clarification, role valuing and power sharing. |
| Macdonald et al. (2010) | Article (Canada) Non-IMR need for IPC curriculum changes | The authors discuss the educational competency 'knowledge of professional role of others' and its associated behavioral indicators, as it relates to the interprofessional education of nursing students. This competency provides a basis to prepare students, preceptors, and faculty for interprofessional practice and develop a tool for performance assessment. |
| Rotegard et al. (2010) | Systematic review (Norway) Non-IMR need for PCC curriculum changes | The authors examine the concept of nursing health assets based on a systematic review of 60 journal articles and web documents (1966-2007) with Rodger's evolutionary method of concept analysis. They conclude that nursing care should be focused on a person's health assets as a complement to traditionally addressing health problems as this may contribute to improved patient health behavior and outcomes. |
| Schattner (2017) | Personal view (USA) Need for PCC curriculum changes | The author describes ongoing deficiencies in provision of PCC amongst residents in IM and FM programs including diminished patient 'face time', focus on 'reason for hospitalization/visit' at the expense of 'secondary' medical issues, limited attention to emotional or contextual problems, limited empathy, neglect of habitual 'reflective practice' and excessive distinction between inpatient and outpatient responsibilities. They speculate that limiting resident work hours might limit learning opportunities and quote that IMRs spend only 9-12% of their time in direct patient care vs. 40-51% using the computer. The author therefore expresses a need to redesign residency programs to incorporate PCC as an integral part of training. |
| Reynolds et al. (1994) | Article (USA) Need for IPC curriculum changes | The authors make recommendations to promote collaboration amongst general physicians including resident IPE, creation of an institutional collaborative curriculum committee, design of a longitudinal curriculum on collaboration, implementation of collaborative patient care in ambulatory clinics and development of integrated systems of care that link inpatient and community-based health services. |
| Gallagher and Gallagher (2012) | Reflections (Ireland) Need for IPC curriculum changes Non-IMR need for IPC curriculum changes | The authors highlight the importance of effective, deliberate collaboration between doctors and pharmacists in providing good patient care in hospitals and clinic settings. They review factors that help or hinder IP working relationships and discuss strategic practice changes such as interprofessional education and standardized medical education in optimal prescribing. |
| Zwarenstein and Reeves (2006) | Systematic review (USA) Need for IPC curriculum changes | The authors present a systematic review of the impact of interprofessional education and collaboration interventions on interprofessional relationships, health care processes, evidence-based practice, knowledge translation and patient outcomes. They highlight the need for rigorous multimethod research studies in these areas. |
| Gillespie et al. (2017) | Literature review (UK, Canada) Need for PCC curriculum changes | The authors conducted a scoping review with a phenomenological orientation to report patients' experiences of caring and characterize uncaring experiences. The review of 43 articles based on nursing, medicine, and physiotherapy in varied care settings revealed that "patients experienced caring when competent professionals displayed positive attitudes, communicated effectively, formed relationships, engaged emotionally and helped navigate clinical services". |
| Kathol and Kathol (2010) | Comments and responses (USA) Need for PCC curriculum changes Need for system-based interventions | This is a comment on the 2010 paper by Weiner SJ et al. titled 'Contextual errors and failures in individualizing patient care: a multicenter study.' The authors highlight that physicians who avoid contextual errors are those that consider the patients' context not as an afterthought but instead as a part of the clinical reasoning process; they believe that such reasoning processes can be effectively taught. They also propose that specialized support personnel such as case managers and midlevel providers could help provide contextually appropriate care. |
| Heyrman (1995) | Article (Belgium) Need for PCC curriculum changes | The author describes patient-centered models of care including goal orientation and functional care models, quality of life measuring instruments and multimedia education. |
| Ruddy et al. (2016) | Commentary (USA) Need for PCC curriculum changes | The authors believe that systemic transformation of the health system is dependent on transformation of individuals who make up the system; technical change such as population health metrics and the creation team-based patient-centered medical homes is not enough. The |

Table 3 (continued)

| Article | Publication type (country) Category assigned | Premise |
|-------------------------------|---|--|
| Coleman and Johnson (2016) | Perspective (USA) Need for PCC curriculum changes Need for IPC curriculum changes | authors therefore describe a need to modify medical training to create a culture aimed at achieving better health, better care, affordability and satisfaction of patients and providers. The authors describes an ideal academic Department of Medicine program in USA that responds to projected shortage of physicians through training strategies, creates clinical programs that value PCC, modifies educational programs to ensure trainees are proficient in core competencies, develops adaptable structures where physicians improve care by engaging in IPC, aligns clinical, research and scholarly activities and invests in faculty career development, infrastructure, interdisciplinary research teams and funding sources. |
| Weinberger et al. (2014) | Ideas and opinions (USA) Need for PCC curriculum changes | The authors advocate for efforts to implement patient- and family- centered care (PFCC) in medical education by altering faculty behavior and evaluating models that effectively incorporate input from patients and families. For example, patients and families can display active roles as teachers and advisors and provide feedback on individual trainees and program effectiveness. Faculty can also encourage discussions about patient and family perspectives in patient notes and teaching venues. |
| Maynard and Heritage (2005) | Article (USA) Need for PCC curriculum changes | The authors discuss the field of conversation analysis (CA) and its contributions to the understanding of the doctor-patient relationship, especially in IM clinics. They also provide suggestions on incorporating CA into the medical curriculum to promote biopsychosocial, patient-centered and relationship-centered approaches to communication. |
| Smith et al. (2005) | Perspective (USA) Need for PCC curriculum changes | The authors discuss the importance of considering attitudes that influence whether a learner will utilize taught clinical skills and present a research-based method for teaching personal awareness of negative attitudes. They propose that selected PCPs can serve as teachers/mentors to teach the personal awareness to students, residents and faculty, through instruction in basic interviewing skills in addition to systematic incorporation throughout training. |
| Meyers et al. (2007) | Best practice guidelines (USA) Need for PCC curriculum changes | The authors describe six recommendations made by the 'Alliance for Academic Internal Medicine Education Redesign Task Force' to improve internal medicine residency education. Strategies include using a framework to focus structure and content of IMR educational experiences, fully adopting learner-specific competency-based education, allowing for increased resident-centered education outside of the IM core, improving ambulatory training and longitudinal care opportunities, using new models to create a core faculty and aligning institutional resources with educational needs. The authors further highlight the need for pilot projects, changes in accreditation requirements and modifications to funding systems. |
| Horwitz et al. (2011) | Review (USA) Need for PCC curriculum changes | The authors conducted a review to assess the quality of IM training programs and identify guiding principles to restructure programs rationally. Identified areas of focus included patient-centered small group teaching and greater incorporation of clinical epidemiology research. They also proposed a Cooperative Educational Studies Group of training programs to create a common targetable data set. |
| Jean-Jacques and Wynia (2012) | Opinion (USA) Need for PCC curriculum changes | This is an opinion piece based on the 2012 publication by Ratanawongsa N et al. where the IM ward team was redesigned to incorporate a PCC curriculum, a substantial reduction in patient load and a more engaged and structured role for attending physicians providing direct supervision and feedback to residents. In this opinion piece, the authors describe the redesign team as a success with higher IMR ratings and greater patient satisfaction, thus advocating for similar reforms in other programs. |
| Kane et al. (2011) | Commentary (USA) Need for PCC curriculum changes | The authors comment on semi-structured interviews with 20 IM program directors exploring practice-based learning and improvement, systems-based practice, interpersonal and communication skills, care setting and IT infrastructure. They discuss the ongoing need to collect and provide quality feedback to IMRs and develop value-added QI programs. |
| Liao et al. (2015) | Perspective (USA) Need for narrative reflective practice in curriculums | The authors recommend the use of narrative medical writing as a viable professional and communication skill in graduate medical education (GME) to promote provision of patient-centered health care by internists. This has been limited by local and system factors however the authors suggest implementable strategies especially by supporting initiatives in population health management, quality improvement and health disparities. |
| Kirkpatrick et al. (1997) | Article (USA) Need for narrative reflective practice in curriculums | The authors discuss narrative reflective practice in the form of storytelling as a way to enhance trainees' sensitivity to illness, humanity, death, dying and advance directives. The use of storytelling is common in nursing education programs and has potential to motivate and inspire human sensitivity skills needed by other interdisciplinary healthcare providers. |
| Prowd et al. (2018) | Best practice guidelines (Canada) Need for system-based interventions | This article describes best practice guidelines implemented by a Canadian Public Health Unit for improved delivery of client-centered care including "building an interdisciplinary team, adapting Registered Nurses' Guidelines to reflect public health practice for nursing and other disciplines, developing a working definition of 'client', engaging staff in knowledge translation, developing policy to support practice change, and incorporating client-centered care principles into daily practice" |
| Monrouxe et al. (2017) | Literature review (UK) Need for IPC curriculum changes | The authors conducted a literature review of primary research studies to characterize UK medical graduates' preparedness and effectiveness of workplace transition interventions. They concluded that graduates are prepared for history and physical taking and some clinical skills but unprepared in areas such as multidisciplinary team-working, prescribing and clinical |

Table 3 (continued)

| Article | Publication type (country) Category assigned | Premise |
|-----------------------|--|---|
| McMahon et al. (2014) | Best practice guidelines (USA) Need for system-based interventions | reasoning. They determined that further educational interventions are needed to address areas of unpreparedness. The authors describe the Choosing Wisely initiative aimed to promote conversations around tests and procedures whose necessity is questionable within the context of each patient’s care plan. They summarize relevant domains including “the strength of evidence for a particular recommendation, a general internists’ “standing” on the topic, the number of patients likely to be affected by the recommendation, the financial impact, the relative cost effectiveness of the intervention and potential harm to the patient. They additionally direct readers to 280 potentially unnecessary medical tests identified by medical societies and consumer groups. |
| Morris (2011) | Opinion (USA) Need for narrative reflective practice in curriculums | This is an opinion piece by an IMR who reflects on observations of PCC provided in a pediatric neonatal ICU and compares this with personal experiences on GIM wards. This self-reflection moved the IMR to practice more patient-centric care while minimizing iatrogenic suffering for patients. |
| Edmond (2010) | Opinion (USA) Need for PCC curriculum changes | The author conveys a criticism of modern medicine and restricted resident work hours. He nostalgically states “when I think back on the aspects of internal medicine that drew me in as a student, it was the internists’ unrushed, careful approach to the patient; their attention to detail; how they interacted with their colleagues and students; and, above all, the time they spent discussing interesting cases that left an indelible impression on me.” |
| Conn et al. (2009) | Article (Canada) Need for IPC curriculum changes | The authors report an ethnographic study of interprofessional communications on two GIM wards through the lens of communication genre theory. They categorize communication as synchronous or asynchronous and find that these have an essential relationship in promoting IPC and can be coordinated to overcome existing communication barriers. |

Categories were assigned to papers. Categories were not predetermined but discerned after a round of review.

the value of AHPs. As noted by Kathol and Kathol (2010) in Table 3, learners must attend to the patient’s narrative and environment, not as an afterthought, but as part of the clinical reasoning process (Kathol and Kathol, 2010).

Physicians practice and value IPC less than allied health professionals. Evidence suggests that physicians do not value IPC as much as AHPs (Table 1) likely because they do not understand the varied interprofessional roles or fully appreciate their impact on patients (Muller-Juge et al., 2013; Card et al., 2014; Blondon et al., 2017; Bochatay et al., 2017; Kashner et al., 2017; Garth et al., 2018). A qualitative study of General Internal Medicine (GIM) wards in Toronto identified several gaps in communication and collaboration between physicians and other AHPs (Zwarenstein et al., 2017). AHPs had frequent deliberative discussions about patients amongst themselves whereas physician interactions with AHPs were limited mostly to structured rounds; physicians made decisions mostly in isolation (Zwarenstein et al., 2017). In another ethnographic field analysis, Chesluk et al. 2010 found that physicians set a hectic pace within an isolated ‘bubble’, seeing patients non-stop and isolating themselves from their staff and other office professionals (Chesluk et al., 2010). In another study, residents were least inclined, amongst AHP students, towards interdisciplinary work; they were less likely to agree that IPC benefits patients and is a good use of time (Leipzig et al., 2002). Profession-focused rather than patient- or team-focused goals, negative stereotyping and hierarchical communication (Thomson et al., 2015) may result in physicians not always prioritizing multidisciplinary rounds, not asking team members for input, or keeping them informed (Garth et al., 2018). Physicians have been trained in a culture where they believe that the team exists to support them: this attitude is negative to team functioning as members may feel disrespected and ignored, leading to decreased confidence and reciprocity (Sidani et al., 2016). Physicians likely lack insight into their own deficiencies (Sidani et al., 2016) thus

highlighting the need for ongoing interprofessional education through school, residency, and practice.

Transforming medical culture is an important first step in promoting PCC and IPC. As shown in Table 3, quality of care improves when it is patient-centered, but medical education is still predominantly disease-centered and teaches individual approach to care (Heyrman, 1995). In order to transform healthcare, it is important to change the culture of the people who practice it (Ruddy et al., 2016) and the institutions where they work. When Horsburgh et al (found in Table 1) surveyed students accepted into undergraduate medicine, nursing and pharmacy programs, they found that professional sub-cultures were present even before they had commenced their education (Horsburgh et al., 2006). Medical students believed that clinical work was the responsibility of individuals, nursing students believed in a collective view, and pharmacy students were at a midpoint in views (Horsburgh et al., 2006). This raises the possibility that our current approaches to selection may be biased towards selecting students for different healthcare professions based on their attitudes and social predilections (Horsburgh et al., 2006). Medical school admission committees must be able to select for learners in medicine with more patient-centric attitudes.

Additionally, IM physicians must also be encouraged to role model patient-centric and collaborative behaviors. Rice et al. (2010) (Table 2) found that senior physicians, nurses and AHPs minimally explained plans for an intervention to junior colleagues and rarely role-modeled PCC supportive attitudes and behaviors. Role-modeling cannot be done well in the current fast paced, interruptive environment with rare and impersonal interprofessional communication and absence of continued leadership and management support (Rice et al., 2010). In addition, staff may themselves not have the required training given what we know about shortcomings in medical education with respect to PCC. Changing individual and institutional culture requires long and

sustained efforts. As suggested in Table 3, in addition to training future physicians, academic programs must focus on faculty development and evaluation for existing staff (Coleman and Johnson, 2016). Institutions need to provide a supportive and accommodating environment and further skills development, for example training physicians in competence based evaluations. Other strategies include promoting diverse and longitudinal mentorship for learners (Coleman and Johnson, 2016).

PCC curricula including didactic learning, observerships, home/hospice visits and patient/family participation report improvements in PCC amongst IMRs. Several PCC educational interventions have been developed and evaluated. Majority of curricula reported a subjective or objective improvement in PCC delivery (Table 2). A curriculum with didactic learning using patient simulations and interview techniques showed objective improvements in a scoring system based on biomedical versus patient-centric conversation analysis (Maatouk-Burmann et al., 2016). IMRs who joined a ward team as a quality officer reported improved awareness of fragmented care, interprofessional roles and patient perspectives (Meade et al., 2015). Improvements were also noted when IMRs observed and managed gaps in post-discharge care through phone-calls, clinics and home visits (Record et al., 2011; Ratanawongsa et al., 2012; Schoenborn and Christmas, 2013; Meade et al., 2015). Residents who participated in home hospice visits were more likely to discuss bereavement support and recommend hospice in subsequent practice (Espada et al., 2015). Both IMRs and patients in the Alike initiative reported higher satisfaction in transitional care, medication adherence and patient understanding, likely attributable to decreased IMR workload, structured post-discharge care and reflective exercises (Ratanawongsa et al., 2012; McMahan et al., 2010; Hanyok et al., 2012). The deliberate practice of observing and working with teams enhanced communication and collaboration skills. IMRs must understand the value of effective interprofessional teamwork for the PCC curricula to change behavior.

As future healthcare workers, our learners will be called upon to deliver more community-based care through patient-centered medical home (PCMH) models and home visits. In a survey of 179 participants, both residents and faculty felt unprepared and reported lacking knowledge for PCMH activities; the authors attributed this to the lack of a formal PCMH curriculum (Block et al., 2017). Medical education should provide training that is sensitive to various care settings and not focus on acute care alone. Home visits can facilitate PCC learning by opening IMR's eyes to the patient's contextual environment, may ensure effective care transitions, and better end of life care through home hospice exposure (Record et al., 2011; Espada et al., 2015). In Table 3, Gillespie emphasizes that PCC curricula needs to train residents in patient-centric tasks such as planning and managing care, educating the patient on navigating the system and enhancing continuity through effective teamwork beyond evidence based care (Gillespie et al., 2017).

As suggested by Weinberger et al. (2014) in Table 3, patients and families can be involved as more active participants to promote Patient and Family-Centered Care (PFCC). They could act as 'faculty', advisors and discussion facilitators in postgraduate resident education and not only be a source of learning but could also provide feedback to the resident and program (Weinberger et al., 2014). Students in a longitudinal curriculum described in Table 2 perceived this intervention to have a positive impact on PFCC (Parent et al., 2016). This is essential for learners to understand the value of team based care from the patient's perspective.

IPC curricula promote interprofessional understanding especially with IMRs as active observers. IPC interventions as part of PCC curricula (Table 2) involving didactic learning (Kowitlawakul et al., 2014; Nothelle et al., 2015; Gupte et al., 2016; Janssen et al., 2017; Sordahl et al., 2018) and/or ward-based (Nabors et al., 2011; Hemming et al., 2016a) or clinic-based patient care (Soones et al., 2015) might improve IMRs understanding of AHP roles and create greater appreciation for their work. A longitudinal interprofessional education (IPE) experience comprising didactic learning, clinic and home visits led to significant improvement in interprofessional attitudes, respect and conflict management even though the intervention did not affect beliefs regarding the effects of IPE on patient outcomes (Hanyok et al., 2013). IMRs are better able to "learn" PCC and IPC traits when observing AHPs, versus interactions in traditional clinical contexts where meaningful collaborations may not occur. A classroom-based IP curriculum with modules, case studies, simulation and shared case planning (Zook et al., 2018) as well as a ward-based IP curriculum focused solely on teaching communication (Rice et al., 2010) had minimal impact on attitudes to IP care. Soones et al. (2015) noted that including residents in IP teams may not be enough to teach the impact of team-based care and that the culture of ultimate resident responsibility negatively impacted team based care (Soones et al., 2015). This suggests that effective educational interventions should allow residents to be a learner in the team with the flexibility to observe AHP roles and not be the responsible provider.

Narrative self-reflection through story-telling and conversation analysis has a positive impact on PCC. Kirkpatrick et al. (1997) (Table 3) state that narrative reflections and storytelling "enhance the learner's sensitivity to the illness experience" and help develop respect and empathy for patients, other professionals and self (Kirkpatrick et al., 1997). As described in Table 2, self-reflection is now regarded as an essential professional skill that can be developed through the practice of narrative writing. The John Hopkins Alike initiative incorporated narrative self-reflective practice into their IM program (McMahon et al., 2010; Ratanawongsa et al., 2012; Schoenborn et al., 2013) with good results. Their residents noted an improvement in their ability to know their patients as people and rates of patient satisfaction also improved (Ratanawongsa et al., 2012). Creating pedagogical space for reflections and mutual sharing can help break down power differentials and reform worldviews based on shared values (Dellasega et al., 2007). Despite benefits, self-reflection is not frequently used in medical training; it has been studied more frequently in interprofessional curricula created for AHPs (Dellasega et al., 2007; Hanson, 2013; Schwind et al., 2014; King et al., 2017).

Conversation analysis (CA) is a tool to help increase personal awareness and facilitate self-reflection (Table 3). It can also be used as an evaluation tool in medical education for feedback and improving patient centered communication competency (Maynard and Heritage, 2005). Reviewing recorded conversations with skilled educators can shed light on unrecognized tendencies and behaviors in trainees during patient interviews including fear of losing control, performance anxiety, over-control by interrupting the patient, avoidance of psychological material such as death, and superficial behavior such as being overly reassuring and passivity (Smith et al., 2005). These attitudes are incompletely recognized by learners and are difficult to change without help (Smith et al., 2005).

Strategies for curriculum and system-based changes to promote PCC and IPC in healthcare. Unfortunately, in the current model of IMR training, PCC is presumed to occur but not directly

addressed. Several reviews and opinion pieces in Table 3 highlight the inadequacies and provide suggestions for curriculum and system-based changes (Reynolds et al., 1994; Orchard et al., 2005; Meyers et al., 2007; Horwitz et al., 2011; Jean-Jacques and Wynia, 2012; Doolittle et al., 2015; Coleman and Johnson, 2016; Ruddy et al., 2016). When an interdisciplinary American initiative tried to transform residency training in family medicine, IM and pediatrics, their efforts were limited by institutional missions, difficulty in engaging stakeholders, and collaborative challenges in developing uniform measures, despite 97% of faculty members reporting an intention to implement PCC (Carney et al., 2015). PCC initiatives will have to overcome many such barriers to implement changes. As alluded to previously, entraining supportive institutional cultures is key to developing the education and clinical space for practice of PCC.

The Alliance for Academic Internal Medicine Education Redesign Task Force has made six recommendations to improve IMR education including improving longitudinal and ambulatory care training, aligning institutional resources with educational needs and adopting resident-specific competency-based education (Meyers et al., 2007). The move towards competency-based education requires that entrustable professional activities (EPAs) such as “recognizes nonverbal cues”, “actively listens”, “responds to emotions” and “practices self-reflection” be developed for resident evaluations (Lown et al., 2016). Other strategies include reduction in patient load that provides time for meaningful, deep reflection (Jean-Jacques and Wynia, 2012); effective, deliberate IPC (Gallagher and Gallagher, 2012), implementation of PFCC (Weinberger et al., 2014), continuous quality improvement (Kane et al., 2011) and as discussed in Table 2, introduction of humanities courses (Dellasega et al., 2007). Smith et al. (2005) present a method for teaching personal awareness of negative attitudes; this can be used by faculty/teachers/mentors to facilitate IMR insight needed for change (Smith et al., 2005). At a foundational level, departments of medicine must address physician shortages, create adaptable clinical programs that are more responsive to patient preferences, prioritize PCC curricula and training, promote investments in interdisciplinary research teams and “team science”, ensure diversity in educational leaders and focus on population management and social determinants of health (Coleman and Johnson, 2016).

Recommendations for educational interventions.

1. Postgraduate medical education must include a curriculum to foster competency in interprofessional PCC. IMRs must develop clarity in their own role as physicians and understand the roles of AHPs in order to allow positive collaboration, shared decision making and patient-centric goals. The focus of patient interviews must expand from biomedical assessment to a broader patient context including appropriate needs assessment.
2. An interprofessional PCC curriculum may be a mix of didactic, simulation and real-world experiences that allow IMRs to observe, participate and deliver PCC over the learning continuum. Educational interventions should allow IMRs to be observers of AHPs in the team rather than continuing their professional role in the context of an IP team. Observation plays a key role as it liberates learners from additional responsibility of actual care delivery during these periods.
3. In addition to acute care, multiple care settings must be integrated into curricula such as ambulatory care, community-based programs and multidisciplinary practices.

4. Home visits, hospice and palliative care should be integrated into curricula to help residents develop a global overview of patients’ experience and develop an insight into humanistic individualized approaches from initial presentation to disease progression to end of life care spanning the entire patient journey.
5. Narrative self-reflection should be integrated into curricula. We recommend one or more narrative reflection exercises for IMRs to encourage consolidation of their experiences. This will lay the foundation for empathetic care while focusing on the patients’ psychosocial context and recognizing their own personal journey through medicine. Conversation analysis (CA) is an additional tool to help increase personal awareness and facilitate self-reflection.
6. PCC evaluation must be revamped by developing entrustable professional activities (EPAs) to assess communication, respect, and empathy in the curriculum and by adopting learner-specific competency-based education.
7. Patients and families should be included in postgraduate resident education as ‘faculty’ and advisors who can educate and provide feedback. Dedicated space and time for IMRs to understand illness from the patient perspective will promote awareness of gaps in care and learning.
8. Faculty development is needed to facilitate culture change in education and practice. IM physicians need to role model patient centric and collaborative behaviors to support and sustain a patient centered attitude in care and education.
9. Medical school admission committees must select for learners with more patient-centric attitudes.
10. Interventions should be implemented at the institutional level. These include decreasing IMR workload, targeting physician shortages, structuring post-discharge care, engaging stakeholders, aligning institutional resources with educational needs, creating flexible educational programs, increasing funding for interdisciplinary research and hiring diverse educational leaders and physicians skilled in PCC.

Limitations and future directions. This is a narrative summary of the literature and many interventions did not measure or report objective findings, making it challenging to assess usefulness of the intervention (Table 2). The majority of interventions described an objective or subjective impact on IPC and/or PCC; only a few were considered to have failed and thus our review lacks dissenting views. This raises a potential for bias and a possibility that the search strategy was not broad enough. This review has focused on PCC and IPC interventions for IM residents and physicians while excluding interventions based solely on medical students from the search. In recent years there has been a significant uptake of interprofessional education (IPE) curricula across programs that teach medical, nursing, and allied health students in a combined, structured curriculum. Further reviews could be undertaken to explore the success of these curricula in promoting PCC and IPC as these students progress in their careers.

Conclusion

As healthcare transitions towards patient centered, community-based care and medical home models, it is becoming increasingly important to train medical residents with the skills to achieve competency in these extended practice areas. This review sheds light on deficient physician skills and attitudes in the arena of patient-centered care, especially when compared to AHPs who receive this foundation early in training. Hierarchical professional attitudes, poor understanding of AHP roles, diminished time for direct patient care, neglect of the patient’s context, inability to

identify and address non-medical problems through effective communication and interprofessional collaboration, and lack of self-reflection are barriers to PCC. This review also highlights the need to deliberately expose and train medical residents in interprofessional interventions and collaborations early in their education in order to improve their outlook and understanding of the roles of other disciplines. The most promising PCC and IPC interventions are those that allow learners time for observation of a multidisciplinary team in action, making holistic patient assessments, developing collaborative care plans and opportunity for reflective practice. Future educational interventions should make space for IMRs to be observers, provide experiential opportunities in non-acute care settings, introduce residents to the patient's environment through home visits and patient/family feedback, and incorporate narrative reflections to deconstruct experiences and assimilate new learning.

Data availability

All data generated or analyzed during this study are included in this published article

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Competing interests

The authors declare no competing interests.

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Not applicable.

Additional information

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