

Setting a research agenda for interprofessional education and collaborative practice in the context of United States health system reform

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ABSTRACT

Interprofessional education (IPE) and collaborative practice (CP) have been prolific areas of inquiry exploring research questions mostly concerned with local program and project assessment. The actual sphere of influence of this research has been limited. Often discussed separately, this article places IPE and CP in the same conceptual space. The interface of these form a nexus where new knowledge creation may be facilitated. Rigorous research on IPE in relation to CP that is relevant to and framed by health system reform in the U.S. is the ultimate research goal of the National Center for Interprofessional Practice and Education at the University of Minnesota. This paper describes the direction and scope for a focused and purposive IPECP research agenda linked to improvement in health outcomes, contextualized by health care reform in the U.S. that has provided a revitalizing energy for this area of inquiry. A research agenda articulates a focus, meaningful and robust questions, and a theory of change within which intervention outcomes are examined. Further, a research agenda identifies the practices the area of inquiry is interested in informing, and the types of study designs and analytic approaches amenable to carrying out the proposed work.

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Introduction

The National Center for Interprofessional Practice and Education at the University of Minnesota (hereafter the National Center) (<https://nexusipe.org/>) is committed to nurturing and producing an evidence-base on the impact of interprofessional education and collaborative practice (IPECP) on both health-related and pre- and post-licensure education outcomes. These efforts are contextualized by the current reform of health care in the United States (US). Underlying this reform is a shift in the focus of the health care delivery system from disease to health and wellness accompanied by the recognition that engaging individuals, families and communities in the redesign of health care is essential. Presently, health care reform efforts are focused on health-related outcomes that entail improving patient experiences of care (including quality and satisfaction), improving the health of populations, and reducing the per capita cost of health care: the triple aim (Berwick, Nolan, & Whittington, 2008).

In comparison to other developed countries, healthcare in the US costs more without having a corresponding positive reflection in quality or health outcomes (Schoen et al., 2007). Moreover, the US health care system is fragmented and uncoordinated (Berwick et al., 2008). The triple aim has galvanized health care reform to focus on population health improvement, reducing the per capita cost of care and improving health care quality. Interprofessional collaborative

practice and team based care have been identified as possible integral components of health care reform that might contribute to achieving the triple aim (Sullivan, Kiovsy, Mason, Hill, & Dukes, 2015).

While IPECP has been an area of scholarly inquiry for over 40 years, the actual sphere of influence emanating from this research has been limited (Baldwin, 2007; Gilbert, 2013; Goldman, Zwarenstein, Bhattacharyya, & Reeves, 2009; Hall & Weaver, 2001; Reeves et al., 2011) in large measure because of scant research efforts investigating the connection of IPECP to health-specific outcomes such as those identified by the triple aim (Berwick et al., 2008). Nevertheless, despite this short-coming, there is sufficient evidence to suggest that with well-designed and focused research studies the contribution of IPECP (if any) to improved health care delivery, health and education outcomes, and reduction in the cost of care could be identified (Gilbert, 2013). Along with well-designed studies, data need be rigorously generated and analyzed to ascertain the contributions of IPECP to current health care reform efforts.

The aim of this paper is to provide direction and scope for a focused and purposive research agenda addressing what IPECP may add in shaping the transformative redesign of the process of health care and in aligning education and clinical practice (Goldman et al., 2009; Thistlethwaite & the GRIN working group, 2012; Zwarenstein, Goldman, & Reeves, 2009). The essential characteristics of a strong and

well-developed research agenda should include a purpose and a focus, emphasize meaningful and robust questions, and provide a framework of change when interventions aimed at modifying or adapting behaviors and/or institutions are being examined (Bartholomew, & Mullen, 2011; Ertmer & Glazewski, 2013). In establishing a research agenda, it is also essential to identify and differentiate between types of study designs amenable to carrying out the proposed work. In order to delineate a research agenda for IPECP, understanding where the area of inquiry has been and currently resides are important. As such, this paper begins by briefly commenting on the current state of the science/art of IPECP research before fleshing out the elements essential to establish a research agenda and make recommendations about best practices to implement research in a way that fosters sustainable, meaningful, and beneficial health care redesign (Ertmer & Glazewski, 2013; Gilbert, 2013; Thistlethwaite, 2012).

What is IPECP?

Shared definitions of interprofessional education and interprofessional collaborative practice are a crucial starting point for any discussion of IPECP. Some scholars engaged in the inquiry of the impact of IPECP on health care and health outcomes have noted that there continues to be inconsistency in defining interprofessional education as well as collaborative practice (Gilbert, 2013; Reeves et al., 2011; Thistlethwaite, 2012). In 2010, the World Health Organization (WHO) adopted a definition of interprofessional education that has been widely accepted, and is used by the National Center. Accordingly, interprofessional education “occurs when two or more professions learn about, from, and with each other to enable effective collaboration and (to) improve health outcomes” (WHO, 2010, p3). In addition, the National Center has adopted the United Kingdom’s Centre for the Advancement of Interprofessional Education’s (CAIPE) definition of collaborative practice which is: “interprofessional collaborative practice happens when multiple health-related workers from different professional backgrounds work together with patients, families, care givers and communities to deliver the highest quality of care” (Barr & Waterton, 1996, pxx). Adopting these specific definitions not only contributes to achieving consensus on the terms that underpin intervention development (a key component of the National Center’s knowledge creation strategy) but establishes a base understanding to help define measurement (an essential component for data collection). Furthermore, established and shared definitions ensure that we are talking about and assessing the same things.

Ultimately, interprofessional education is a means to an end just as collaborative practice is (Frenk et al., 2010; Hall, et al., 2001; Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013). The first (IPE) is an intervention that may take on many different forms that could ostensibly create transformative learning (Frenk et al., 2010) resulting in the second (CP). Collaborative practice is the means, with other factors and variables, by which outcomes of the triple aim related to

patient health care cost, health care quality, and eventual improvement in population health could be impacted.

Why the current interest in IPECP?

Since the 1970s, there have been periodic cycles of interest (Brandt, Lutfiyya, King, & Chioreso, 2014; Schmitt, 1994) in the potential of IPECP to substantively influence the reshaping of both the process of health care and health outcomes; we are now experiencing another resurgence. The National Center arose out of this resurgent interest in IPECP. The establishment of the National Center resulted from a national competitive process with funding from the US Health Resources and Services Administration (HRSA) and a group of private foundations.

Historically and presently, forces in the marketplace of health and health care have driven interest in IPECP. Currently, change in the health care marketplace is being compelled by: the transition from treating disease to the prevention and maintenance of health with greater individual and community responsibility, increased numbers of people with long term chronic conditions requiring complex care, the desire to reduce the per capita cost of care while adding value to the health care process, the continued integration of systems of care with providers as employees, and the need for increased access to care as the number of health insured increases.

Understandably the recent resurgence of interest raises the question of why IPECP has not already been embraced and fully adopted. A now 20-year-old editorial summarized four reasons for IPECP not catching fire: (1) a widespread lack of training of care providers in an interprofessional approach, (2) the complexity of implementing interprofessional care, (3) the increasing demand for documentation of cost effectiveness, and 4) the lack of systematic study of the process and outcomes of the interprofessional approach (Schmitt, 1994). Despite numerous IPECP programs in universities and Academic Health Centers throughout the US, these challenges remain and in many ways accurately describe the current state of the art/science.

Berwick et al. (2008) proposed the triple aim as the health outcomes that should be used in transforming the direction and purpose of the redesign of health care. Similarly, in a 2010 World Health Organization report, a connection was made between IPECP, in particular interprofessional health care teams, and the provision of better health care services that would eventually lead to improved health outcomes (WHO, 2010). Unequivocally, interest has grown in integrating interprofessionalism into the redesign of health care, including aligning education and clinical practice to form a learning collaborative focused on improving health care and health-related outcomes. A critical motive for the creation of the National Center in 2012 was the resurgence of interest in IPECP in a health care environment energized by significant practice and health policy changes.

What do we know about IPECP?

With such a long history, a plethora of reviews has been conducted on the status of IPECP research from numerous perspectives. At this juncture we know that very little IPECP

research has dealt with big picture outcomes (Brandt et al., 2014) and the literature on the effectiveness of health care teams (interprofessional or not) has yielded mixed results (Lemieux-Charles & McGuire, 2006). IPECP competencies have been defined and partially adopted (Interprofessional Education Collaborative, 2011) but there is increasing recognition that additional competencies are needed. Moreover, there remains a gap between the identification and subsequent application of educational (pre- and post-licensure) best practices (Weaver et al., 2010). Further, sound, reliable and validated assessment instrument tools are in short supply (Canadian Interprofessional Health Collaborative, 2012).

Systematic reviews of the research literature regarding the impact of IPECP reveal that much of the inquiry has been focused on examining three levels of impact – *individual immediate or short-term changes* on learner knowledge, skills, and attitudes; *practice level* for practice-based processes—but not outcomes; and *organizational level* for intermediate policy changes (Brandt et al., 2014; Reeves, Goldman, & Zwarenstein, 2009; Goldman et al., 2009). There is little in the literature that explicitly maps IPECP interventions to the outcomes of population health, a reduction in the cost of health care, the engagement of patients, families and communities, and better linkage between education and clinical practice. (Brandt et al., 2014). Gilbert (2013) noted that one of the most frequently asked questions regarding interprofessional education (and we would extend this to include collaborative practice) is – does it make a difference to health care? He averred that the best response, attributed to DeWitt Baldwin, is: “interprofessional education [and collaborative practice] is a great truth awaiting scientific confirmation” (p.283).

Early results demonstrating the success of teams in the health delivery system (Salas et al., 2008) and the Patient-Centered Medical Home (PCMH), or health home, model (Cronholm et al., 2013) add credence that IPECP could add value in the shift to a focus on outcomes-based systems of health. Other research, however, has demonstrated that achieving a positive impact of collaborative practice is not consistent and often context-specific (Gilman, Chokshi, Bowen, Rugen, & Cox, 2011).

In 2009 six national education associations of health professions schools (American Association of Colleges of Nursing, American Association of Colleges of Osteopathic Medicine, American Association of Colleges of Pharmacy, American Dental Education Association, American Association of Medical Colleges, and Association of Schools and Programs of Public Health) formed a collaborative to promote and encourage efforts advancing essential interprofessional learning experiences aimed at preparing future health professionals to provide team-based care. The resultant organization was the Interprofessional Education Collaborative (IPEC) and represented allopathic and osteopathic medicine, dentistry, nursing, pharmacy, and public health. IPEC has defined competencies for interprofessional practice (Interprofessional Education Collaborative, 2011). These competencies have been generally accepted by health care professions accrediting bodies in the US and encompass the domains of values and ethics, roles and responsibilities,

interprofessional communications, teams and teamwork. Since their publication, we have observed that additional competencies have been identified as essential including: understanding population health, informatics, evidence-based patient centered care, quality improvement processes and technology, an understanding of systems, and cost-effective practices.

With defined competencies adopted by multiple health professional accreditation entities, there is a great demand for answers to the question: *How do we do IPECP?* Absent is a sound evidence base regarding what the specific education and training should be for all learners – students and clinicians. Furthermore, there is also a lack of tools for assessment of site readiness for interprofessional education work, for measuring what is and should be learned, what team dynamic and interactions are, as well as what outcomes should be planned for and actually achieved (Canadian Interprofessional Health Collaborative, 2012; Reeves et al., 2013; Salas et al., 2008). Moreover, exactly how health care teams should be constituted to achieve desired outcomes also requires more clarification (Weaver et al., 2010).

We have observed that an increasing number of stakeholders are enthusiastic about IPECP involved in the redesign of the health system, e.g. educational institutions, health systems, payers, policy makers and regulators. The major criteria for success mostly remain outcomes achieved with some assessment of learner satisfaction with their interprofessional experiences (Brandt et al., 2014). However, most stakeholders are interested in more definitive evidence of the effectiveness of IPECP, return on investment, what the most effective team models are, and what essential factors are needed for sustainable change within their distinctive environments. Additional information is needed about how IPECP impacts population health as well as engages patients, families and communities (Garr, Margalit, Jameton, & Cerra, 2012).

New enthusiasm for IPECP and identified gaps underscore the need to establish a research agenda that can produce a relevant and scientifically sound evidentiary base identifying if and how IPECP might lead to health and education outcome improvement. Establishing such an agenda demands the redirection of the research from the current program/project process specific level to the assessment of the impact of IPECP on outcomes defined by the triple aim.

What do we need to know to establish IPECP as an effective approach to health and education outcome improvement?

At present, knowledge creation linking IPECP to improvements in education and health outcomes is occurring in local geographies and settings. While the creation of the National Center is moving a national coordination effort ahead, these local efforts lacked coordination, a platform for creating opportunities for meaningful team interventions, a trusted source of information, and a national database focused on the efficacy and effectiveness of IPECP linked to outcome improvement. Also needed are relevant research questions and suitable methodologies that can

produce generalizable and translational knowledge with clinical and educational application. For research findings to influence the transformation of the health care system, they must be rigorously generated employing quantitative, qualitative and mixed methods, and be based on sufficient sample sizes to achieve generalizability, trustworthiness, and external validity. Moving this area of inquiry forward requires asking questions about the impact of IPECP in new ways that call for the examination of as yet untested associations and sequential pathways between and among the domains of interprofessional education, collaborative practice, and health care delivery, health outcomes, and health care costs.

Among the untested associations we foresee are those that posit and develop triple aim (Berwick et al., 2008) health-related outcomes as dependent variables, data collected on multiple dimensions of interprofessional education interventions and dimensions of collaborative practice as independent variables, and demographic and ecological variables as covariates. Of equal importance is high quality qualitative research that documents context specific experiences with implications for other settings, particularly when the transportability and scalability of a success intervention is achieved. While generating and collecting these data will require a serious commitment of resources, the ultimate value of understanding the extent to which – and in what ways – IPECP may affect the cost of delivered care, the quality and patient experience of delivered care, and population health should make the commitment of time and resources worthwhile.

While randomized control trials (RCT) are often considered the gold standard for advancing scientific knowledge creation (Safford, 2014), this methodology is expensive, time intensive, and frequently not an appropriate approach for most research questions (Dreyer et al., 2010; Safford, 2014) because, the results from RCTs do not always match what is observed in real-world practice or can account for meaningful changes in the local environment as the study progresses (Dreyer et al., 2010). Comparative effectiveness research (CER) consisting of observational studies that are well-designed and which analyze data from large population samples can address questions that are not possible to answer using a RCT methodology alone (Dreyer et al., 2010; Safford, 2014). Intervention research is a significant CER study design and has been adopted by the National Center as the favored approach to generate data, produce information translated into knowledge.

Since the redesign of health care delivery is occurring rapidly, the data generated for decision making requires a CER approach relying on an informatics platform for the generation and subsequent use of large scale databases that are amenable to both cross-sectional and longitudinal analyses. The data collected also need to capture sentinel events that when analyzed can produce timely and actionable information to facilitate making the best decisions possible in a rapidly changing health care environment. In practice, outcome goals and metrics are established and interventions are implemented and modified on an ongoing basis to quickly move toward desired outcomes.

Time is of the essence, as is an understanding of the impact of ecological factors that affect the ability of an intervention to be successful.

The National Center's Nexus

The National Center's approach is one of the aligning education and collaborative practices in a way that creates a dynamic and transformative interaction and produces interprofessional teams capable of substantively improving both education and health outcomes. The alignment of health-related education and collaborative practice represents an IPECP Nexus that informs change at the micro, meso and macro levels and both informs and facilitates the redesign of health and education. This dynamic of the National Center's Nexus is depicted in Figure 1.

The US current health care delivery and education systems could be described as consisting of: health care professions and a delivery system fragmented and siloed and not clearly mapped to triple aim outcomes (Berwick et al., 2008); health science academic training and health system re-design disconnected at many junctures (Cerra, & Brandt, 2011); persons of local communities not engaged in health care delivery system redesign (Berwick et al., 2008); interprofessional outcome-orientation underdeveloped (Brandt et al., 2014); health care workforce planning disconnected from an interprofessional team-based orientation (Schuetz, Mann, & Everett, 2010); and health care related knowledge creation by interprofessional research teams as less than optimal (Lakhani, Benzie, & Hayden, 2012; Robinson, Erlen, Rubio, Kapoor, & Poloyac, 2013). These are all among the elements of the health care delivery system that current health care reform in the US seeks to change.

Change occurs at multiple levels three of which are: micro, meso and macro (D'Amour & Oandasan, 2005). Micro level changes in clinical settings entail health care professionals interacting with one another in new and different ways to improve the quality and outcomes of care provided to patients. In educational settings, micro level change involves students and faculty from a variety of health-related professions learning with one another in new and different ways in didactic offerings, simulated clinical experiences and experiential activities.

Organizational change constitutes the *meso level*. An example is a clinic or constellation of clinics undergoing a concerted effort at re-designing their care delivery process and/or approach. In education, an example is an academic health center or a regional collaborative of universities and colleges transforming curricula to incorporate interprofessional education.

Macro level change encompasses societal level changes at the institutional, state and/or national levels supported by policy changes. An example of macro level change includes new accreditation criteria for different professions impacting education and credentialing.

Fostering deliberate behavior change through IPECP interventions, a CER study design strategy, which improve triple aim outcomes encompasses the work of the Nexus.



Figure 1. The National Center Vision. © The National Center for Interprofessional Practice and Education. Reproduced by permission of The National Center for Interprofessional Practice and Education. Permission to reuse must be obtained from the rightsholder.

The National Center has established a dynamic incubator network that constitutes a living laboratory to explore the impact of IPECP interventions with outcomes clearly mapped to those of the triple aim. The logic of interventions (Figure 2) is that as they are implemented, they will influence behavior change in those exposed and may result in subsequent changes impacting micro, meso or macro levels of the process of care. If the resulting change is desired it may become institutionalized and an infrastructure will emerge to support and maintain the change. A multiplicity of ecological variables influence the development of such an infrastructure – it is multifactorial and not always predictable. This flows from goals to objective to initiatives or activities to process outputs and then

health and education outcomes, while tracking for sustainable change, creates a database from which analytics can then inform and shape the conversations and actions of the redesign of health and education.

Meaningful and robust research questions and study designs

Five research questions have been identified by the National Center and are currently being addressed within the National Center’s Nexus of Inquiry. These are: Does intentional and concerted interprofessional education and interprofessional practice:

- Improve the triple aim outcomes on an individual and population level?
- Result in sustainable and adaptive infrastructure that supports the triple aim outcomes of both education and practice?
- Identify ecological factors essential for achieving triple aim outcomes?
- Identify factors essential for systematic and adaptive infrastructure in the transformation of the process of care and education?
- Identify changes needed in policy, accreditation, credentialing and licensing for health care provision and education?

The National Center has developed and is currently populating a relational database, named the National Center Data

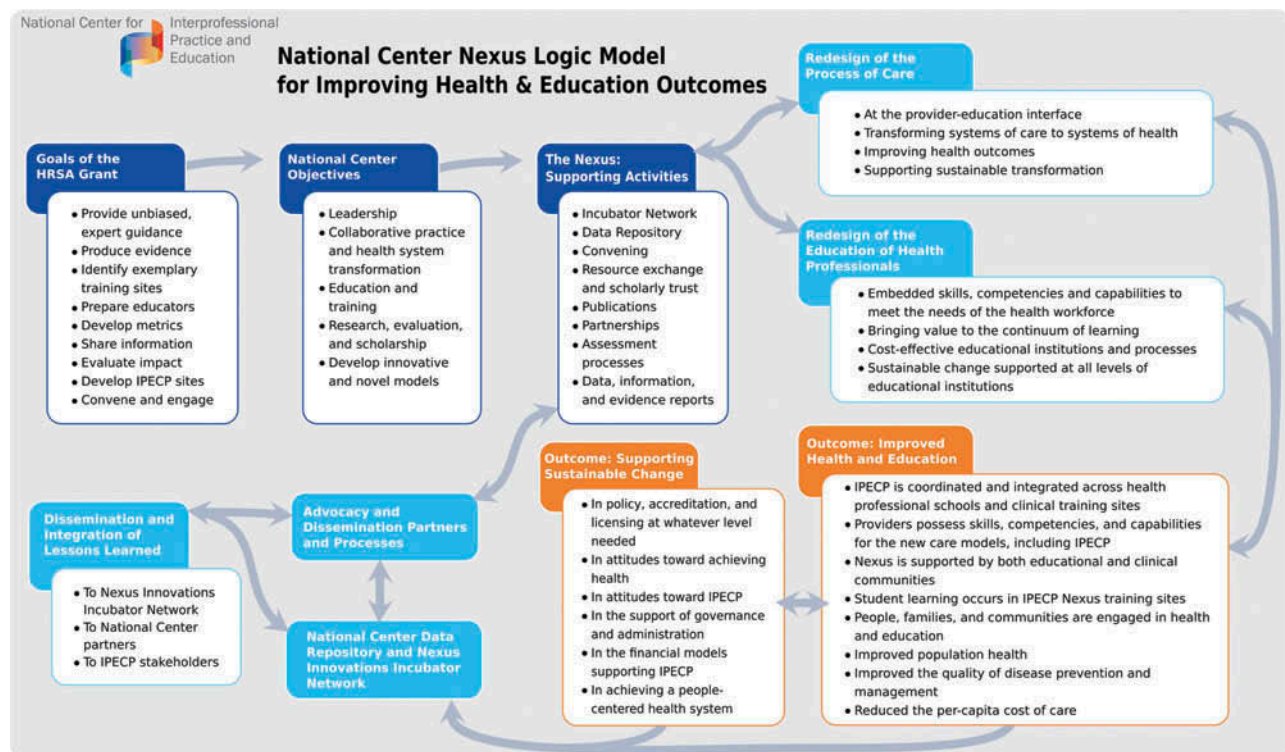


Figure 2. Nexus Research Logic Model. © The National Center for Interprofessional Practice and Education. Reproduced by permission of The National Center for Interprofessional Practice and Education. Permission to reuse must be obtained from the rightsholder.

Repository (NCDR), to collect and house not only incubator project specific data but also data from entities across the nation involved in interprofessional education and collaborative practice initiatives. The former will support the analysis of data generated from intervention focused work while the latter will facilitate the generation of additional big data for observational studies – either cross-sectional or longitudinal studies (matched or unmatched) (Last, 1995) and commensurate with the principles of CER. Their application is presented as follows.

The Nexus Innovation Incubator Network and National Center Data Repository

To generate and gather the data, the National Center has created a national network of nexus sites, each with one or more projects or interventions employing the nexus model linking interprofessional education, collaborative practice, and health outcome improvement. An essential related component is the National Center Data Repository (NCDR). The National Center Nexus Innovations Incubator Network is a collaborative of higher education and health system partners in the US committed to studying and advancing interprofessional practice and education together. Incubator members are: testing new organizational, care delivery and learning models in real-world settings; identifying, collecting and analyzing data to create an evidence base for IPECP; identifying evidence-based models to educate health professions students and practitioners; and training faculty, students, clinicians and staff as teams to build leadership skills and develop the capacity for data collection and intervention research (www.nexu.sipe.org). The landscape of the Incubator Network is constantly in flux as new sites and new intervention projects are added to the network. Presently, all of the sites and interventions are in the US. The process for becoming an incubator site is described elsewhere (Pechacek, Cerra, Brandt, Lutfiyya, & Delany, 2015).

The NCDR was designed to address the decades-old challenge of the lack of data to test the effectiveness of interprofessional models. The NCDR and the Incubator Network are inseparable, forming a knowledge generation community. The NCDR houses or stores the data generated from interventions and incubator sites. These data, once analyzed, will enable the National Center to demonstrate if and what the relationship is between IPECP and triple aim outcomes. Moreover, once there are sufficient data in the NCDR, researchers outside of the National Center and its networks will be allowed access to the NCDR to perform analyses.

The NCDR resides in the University of Minnesota Academic Health Center's Information Exchange and is built on a robust information architecture platform. The Academic Health Center Information Exchange has existing policies and procedures in place to manage privacy, access to and governance of data. Further, an NCDR Advisory Council, comprised of recognized experts in the field representing clinical practice, education and informatics advises National Center staff on implementation, metrics, and evaluation of the NCDR. The NCDR:

- Focuses on outcome achievements for both education and health
- Includes surveys that capture the environmental and ecological factors influencing interventions
- Supports identifying the linkages between the educational intervention to outputs and outcomes achieved
- Facilitates producing a return on investment analysis
- Ensures data are collected longitudinally during and after the intervention
- Produces information from data collected using available and validated assessment tools.

The approach to generating the data that can be used to provide the information and evidence for the analysis of these questions constitutes the National Center Nexus Learning System. Achieving the production of meaningful and relevant information and evidence requires the integration of the disciplines of evaluation, outcomes research, and informatics. Such an integration achieves the development of data inputs and analytics that have the ability to produce insights and answers to the core questions of the National Center.

The National Center Data Repository architecture has several components, described in Table I. The NCDR has been through end-to-end testing and is now being populated.

As soon as a critical amount of data is achieved, the analytical work will begin and reports generated for use in informing the redesign process. The NCDR, as it becomes populated, will provide a sound informatics foundation for the generation of new knowledge regarding the impact of interprofessional education and collaborative practice over time. Figure 3 illustrates the working process of the NCDR.

Concluding comments

This paper sought to provide direction and scope for a focused and purposive research agenda for IPECP in the

Table 1. National Center for Interprofessional Practice and Education Data Repository (NCDR) architecture components.

Component	Description
Input	Data are entered into a secure data environment through a user-friendly web interface • all Nexus sites and intervention projects receive training and assistance with data entry
Core Data Set	There are six core data surveys: • Student Survey • Network User Survey • Technology Readiness Survey • Inputs Survey • Education Survey • Education Survey • Critical Incidents Survey
IPECP Intervention Specific Data Survey	There are two parts to this survey: • common data elements or variables for all interventions or projects • outcomes specific elements or variables for each individual intervention or project
Outcomes	• All NCDR surveys are designed to collect pertinent data for analysis to answer the research questions constituting the National Center's research agenda • Outcome data are clearly defined and collected for analysis

All data entered into the NCDR are de-identified.

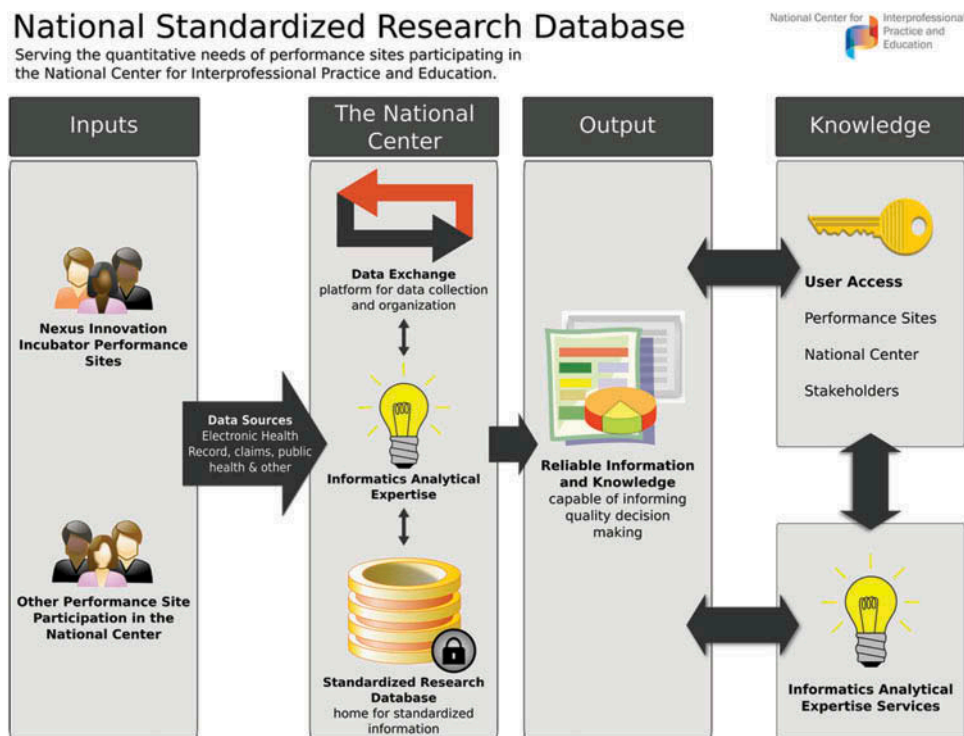


Figure 3. Depiction of the National Center's Data Repository. © The National Center for Interprofessional Practice and Education. Reproduced by permission of The National Center for Interprofessional Practice and Education. Permission to reuse must be obtained from the rightsholder.

current context of health care reform in the US. For the better part of the past four decades inquiry into interprofessional collaborative practice and education has been prolific, although mostly limited to exploring research questions grounded in local program and/or project assessment. Because of the limited scope of the research questions, despite this long history, the actual sphere of influence stemming from interprofessional collaborative practice and education research has been limited.

The research agenda proposed in this paper, for this area of inquiry, should produce a significant and scientifically sound evidentiary base tying interprofessional education and collaborative practice to meaningful health-related outcomes and as a result could extend the sphere of influence of the produced knowledge. Ultimately, the proposed research agenda represents a paradigm shift that has been long in the making and calls for the elevation of the research foci from that of program/project specific level impacts to the impact of interprofessional collaborative practice and education on outcomes related to patient health care cost, health care quality, and eventual improvement in population health. The knowledge generation community needs to be thoughtfully expanded using the platform and tools that have been and are being created in order to achieve the threshold of “big data” needed to successfully inform and shape the redesign of both education and health care.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the writing and content of this article.

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