

A Review and Synthesis of TBPCCE Evaluation in Canada: Looking beyond the Quadruple Aim

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Abstract

Background: The objectives of this article are: 1. To synthesize peer-reviewed evidence on the outcomes of team-based primary and community care (TBPCC) in Canada on Patient and Provider Experience, Population Health, and Health Care Costs (Quadruple Aim); 2. To introduce the TBPCC Evaluation Framework; and 3. To extend the critical interpretive synthesis to include the additional four domains from the TBPCC Evaluation Framework (i.e., Relationship Centred Care, Care Process and Quality, Team Function and TBC Foundations).

Methods: We conducted a review of the following databases: Medline (OVID and PubMed), CINAHL, Embase, SportDiscus, and PsycINFO as well as an advanced search with Google Scholar (Title only) with the words “Canada AND primary AND team”. Review concepts included: population (patients), intervention (team-based primary health care), comparator (usual care, single practitioner delivery mode), outcome (patient and provider experience, population health, and health care costs), time (2000-present), and type (randomized controlled trials, controlled trials, quasi-experimental designs, and implementation studies/evaluations). We excluded reviews, opinion papers, laboratory-based studies, and studies based outside of Canada.

Results: Forty-five publications met our inclusion criteria with the majority of these (34) from Central Canada. Results were initially mapped to the domains of the Quadruple Aim, with 51% (23/45) aligning. The additional domains from the TBPCC Evaluation Framework (Team Function, Relationship Centred Care, Care Process and Quality and Team-Based Care Foundations) and the Team-Based Care (TBC) Adoption Model were integrated into the synthesis. 100% of the included articles reported outcomes that aligned with the TBPCC Evaluation Framework.

Conclusion: Across Canada, the value of relationships, shared understanding, communication, and coordination across teams are highlighted as is the potential of TBC to result in improvements in patient and provider experience, team function, and the quality of care. By encouraging a focus on formative as well as summative evaluation, the TBPCC Evaluation Framework provides a comprehensive approach to assessing the evidence needed to support actionable improvements for TBPCC in Canada. Trial Registration: To identify peer-reviewed literature, we followed standard review methodology and reporting guidelines as established by PRISMA. We registered our review on PROSPERO (2018 CRD42018091086).

Background

In Canada there is a push and a need for primary care transformation to address increasing costs, shortage of primary care providers (PCPs), and changing population needs (1). Calls for transformation are motivated by a desire to achieve the Quadruple Aim as an approach to optimizing health system performance in four areas of focus: improving the health of populations, enhancing patient and provider experience of care, and reducing per capita costs of healthcare (2,3).

There is recognition of the value of team-based primary and community care (TBPCC) (4–8). Evidence suggests that TBPCC practices are able to provide more appropriate care to their patients (8–10) with improved comprehensiveness, coordination, and efficiency of care (10,11), and lower burnout rates for providers (12). Research focused on an assessment of progress in the transition to team-based practice emphasizes key change concepts for practice transformation: empanelment (attachment of patients to primary care providers),

continuous and team-based healing relationships, patient-centred interactions, engaged leadership, quality improvement strategy, enhanced access, care coordination, and evidence-based care (13).

The Patient Medical Home (PMH) model is dominant across North America and is a building block of TBPCC in Canada. The College of Family Physicians of Canada defines the PMH as a medical office or clinic where each patient has: her or his own family doctor; other health professionals working as a team with the patient's doctor; timely appointments for all visits; arrangement and coordination of all other medical services; an electronic medical record; and ongoing evaluation and quality improvement programs (6).

Ontario's Family Health Team (FHT) model, implemented in 2005, may be Canada's, if not North America's, largest example of a jurisdictional model for a PMH. The model is based on multidisciplinary teams and an innovative incentive-based funding system. Nearly 2 million Ontarians are served by 170 FHTs (14). However, health systems transformation is complex (15) and its progress in Canada is varied province by province (16–18).

There are several review articles focused on attributes of TBC in the US and internationally (1,4,8,19–22); however, there is a gap in synthesizing evaluations of TBPCC in Canada. While the Quadruple Aim provides a framework for the assessment of many of the more longitudinal outcomes of TBPCC, the transformation of primary care is a process that occurs over time and requires a focus on formative as well as summative evaluation.

The TBPCC Evaluation Framework

Langton et al., (2016) emphasizes the importance of congruence between “a primary care performance measurement system and accepted conceptual frameworks that articulate important features of high-quality primary care systems” (p. 37). In anticipation of the need for a coordinated approach to evaluation, we developed the TBPCC Evaluation Framework (Figure 1). It is derived from the literature on TBC and was developed through an iterative process including the synthesis of literature and a review process with stakeholders: policymakers, TBC project leaders in communities, and researchers with relevant expertise. The literature was synthesised into a draft framework with a number of dimensions.

The TBPCC Evaluation Framework is situated in the healthcare system, as illustrated by the World Health Organization's partnership pentagon, which includes key stakeholder groups (23). The framework includes eight dimensions: Relationship Centred Care, Patient Experience, Provider Experience, Team Function, Care Process and Quality, Team Based Care Foundations, Population Health, and Health Care Costs. These incorporate the Quadruple Aim.

Under each dimension, specific aspects have been defined, which were assigned specific measures. Validated and published evaluation tools were collected from the literature for consideration and were mapped to the framework.

Figure 1: TBPCC Evaluation Framework

Table 1: Eight TBPCC Evaluation Framework Dimensions

Relationship Centred Care	The focus, in TBC, on supporting caring relationships between the patient, family and their providers
Patient Experience	Patient and family's subjective experience of care
Provider Experience	Experience of individual providers in doing their work
Team Function	How team members interact to contribute to comprehensive, coordinated care
Care Process and Quality	Measuring appropriateness, efficiency, and effectiveness of care services provided to patients
TBC Foundations	Features of the community, policy, funding, etc. that enable an effective TBC practice
Population Health	Assessment of health systems utilization and health outcomes for the population served
Health Care Costs	Measurement of the costs of care both within the TBC practice and overall for the population served

Relationship Centered Care (RCC) assesses the quality and continuity of a therapeutic relationship between the patient and the patient's providers. RCC includes patient perceptions of provider-patient connection, cultural sensitivity/safety, and relationship continuity.

Patient Experience is the patient and family's subjective experience of the care they receive. Systematic reviews have shown strong correlation between patient experience of care and clinical safety/ effectiveness (24). This dimension is a component of the Quadruple Aim and includes patient experience of care, team, and clinic-facilities. It includes patient perception of access to care and patient empowerment.

Provider Experience is the subjective experiences of individual providers in the team about their work. This includes the delivery of care to patients, their interactions with their work environment, the impact of policy on TBC and role-definition, and work/life balance. It is also one component of the Quadruple Aim.

Team Function is focused on the structure and operation of a team, the interactions of team members, and the additional supports that contribute to comprehensive, coordinated care. Aspects of team function include team leadership, team composition, team capacity, team communication/coordination, team trust/relationships, and the use of enabling tools (education, IT).

Care Process and Quality assesses services actively provided to patients in contrast to overall care outcomes for the population served (see health of the population dimension). Care Process and Quality includes access, health promotion, preventive care, chronic disease management, and urgent episodic illness.

TBC Foundations are features of the community, TBPC policies, jurisdictional systems, and the supporting organization(s) that enable an effective TBC practice. In particular, this includes the development of a shared vision of TBC and facilitates the alignment of policy planning to support the implementation of TBC. Aspects of TBC foundations include office space and resources, education and training, policy, scopes of practice, funding models and incentives, community supports, and regional supports.

Health of the Population is the assessment of broader health systems utilization measures and health outcomes for the population that is being supported by the team. In contrast to Care Process and Quality dimension, this includes whether individuals access care or not. The Population Health dimension includes aspects such as attachment, health promotion and preventive care, CDM, episodic illness management, and health system utilization.

Healthcare Costs includes the tracking and analysis of total costs associated with individual patients within a TBPCC practice. This includes consideration of the broader, systems level costs that are influenced by the transition to TBPCC. This dimension includes facility/operational costs, direct service costs, total healthcare spending per person, hospital and ED utilization rates and costs, and medication costs.

Assessing the long-term benefits of systems change requires 5-10 years (25,26); however, shorter-term evaluation is needed to support decision makers, continuous quality improvement, adaptation, and flexibility to ensure process is relevant to specific contexts and communities. To complement the dimensions, the TBPCC framework includes an adoption model (Figure 2), adapted from the Clinical Adoption Meta Model (27). This encourages thinking on the evolution of indicators over time from measuring baseline and early intention to change through to observable behaviour changes to long-term outcomes.

Figure 2: TBPCC Adoption Model

Purpose

The purpose of this paper is threefold: 1. To synthesize peer-reviewed evidence on the outcomes of team-based primary and community care (TBPCC) in Canada on Patient and Provider Experience, Population Health, and Health Care Costs (Quadruple Aim) (3); 2. To introduce the TBPCC Evaluation Framework to address gaps identified in the synthesis; and 3. To extend the critical interpretive synthesis to include the additional four domains from the TBPCC Evaluation Framework (i.e., Relationship Centred Care, Care Process and Quality, Team Function and TBC Foundations).

Methods

Search Strategy and Selection Criteria

To identify peer-reviewed literature, we followed standard review methodology and reporting guidelines as established by PRISMA (28). We registered our review on PROSPERO (2018 CRD42018091086), and our synthesis concepts were: population (patients), intervention (team-based primary health care), comparator (usual care, single practitioner delivery mode), outcome (patient and provider experience, population health, and health care costs), time (2000 to present), and type (randomized controlled trials, controlled trials, quasi-experimental designs, and implementation studies/evaluations).

We searched the following databases using Medical Subject Headings (MeSH) and keywords: Cochrane Database of Systematic Reviews, Medline (OVID and PubMed), CINAHL, Embase, SportDiscus, and PsycINFO. We also conducted an advanced search with Google Scholar (Title only) with the words “Canada AND primary AND

team". We conducted the last search on April 7, 2019. One author screened for year of publication, type of study, and duplicates. 1,137 studies were imported for screening into Covidence, a review production system (Covidence.org, Melbourne Aus.). After duplicate removal, 994 studies were screened. We included studies based in Canada, and a priori chose to only include studies published in 2000 and later (29). We excluded reviews, opinion papers, laboratory-based studies, and studies based outside of Canada. Two authors screened citations at the title and abstract level (Level 1). 747 studies were identified as irrelevant, and 242 studies were included for full-text screening. Two authors then reviewed 242 citations at the full-text level (Level 2); and a third author reviewed conflicts. 71 studies were then included for data extraction. We further conducted a backward (reference lists) and forward citation search for articles included at Level 2. The last search was conducted on April 25, 2019.

Data Extraction

Once the final list was generated, one author extracted data based on a pre-developed data extraction sheet and another author reviewed it. We extracted the following information: authors; province; location (urban/small urban/rural); year; study design; funding model; organizational structure; team composition, traits, and communication; patient population; health care costs; identified enablers, facilitators, and challenges; and funding sources for research. We categorized included studies by region. We reviewed each study to extract data related to the Quadruple Aim outcomes, summarized findings and assessed studies for risk of bias. The extraction spreadsheet was reviewed and confirmed by a second author.

Critical Interpretive Synthesis

Recognizing the limitations of the aggregative focus of the data typically generated by a systematic review process (30) and the complexity of primary care transformation (26,31), this review was approached as a critical interpretive synthesis (30,32). Initially, findings were synthesized to assess outcomes in the context of the Quadruple Aim. As our synthesis progressed and it became apparent there were very few Canadian studies focused on the evaluation of TBC that aligned with these four outcomes. After data from the 71 studies were extracted, we further excluded studies that focused on evaluating addition of only single medical role into clinical practices, evaluating administrative changes in how practices are managed (e.g. new access scheduling methodology), or assessing a specific evaluation method, resulting in additional 26 exclusions. The additional dimensions of the TBPC Evaluation Framework were then drawn into the synthesis along with the perspective provided by the Adoption Model, enabling a review of formative as well as summative outcomes.

Results

There were 45 peer-reviewed publications that met our final inclusion criteria. Regional representation for studies included: none from the West Coast (British Columbia); seven Prairie Provinces (Alberta, Saskatchewan, Manitoba); 34 Central Canada (Ontario, Quebec); one Atlantic Canada (New Brunswick, Nova Scotia, PEI, Newfoundland); none from the Territories (Yukon, Northwest Territories, Nunavut); and three pan-Canadian.

Mapping of Studies to Quadruple Aim and the TBPC Evaluation Framework

There were 23 of the 45 included studies (51%) that assessed at least one element of the Quadruple Aim. Patient experience was the most commonly assessed, followed by provider experience. The majority of studies were from Central Canada, with 32 studies from Ontario. 100% of the included studies reported on outcomes reflected in the TBPC Evaluation Framework. The top dimensions in the synthesis were Team Function (24 studies), and Care Process and Quality (21 studies) (see Table 2), neither of which are explicitly reflected in the Quadruple Aim.

West Coast

There were no included studies identified from this region.

Prairie Provinces

Four of the seven studies from the Prairie Provinces (Alberta=6, Manitoba=1) mapped to the Quadruple Aim. Two studies reported on patient experience (33,34), one on population health (35), and one on provider experience (36). Three of seven studies reported on team collaboration and function as important components of transitioning to TBC (36–38). Emerging themes from the studies were patient needs regarding respect, support, and advocacy, and improved knowledge, independence, care received, ability to make decisions, and overall health. Other related themes included: provider and patient experience with overall delivery and quality of care (33–35,39), provider remuneration, and support for information technology, leadership, and education (38).

There was discordance for the two studies that focused on perceptions of access to care. One study emphasized that while the respect, support, and community advocacy provided to patients as a result of a TBC model was appreciated, accessibility continued to be a barrier for patients (33). Another study reported a perceived benefit improvement in access to care (34). One study noted increased job satisfaction for providers (36).

Central Canada

18 of the 34 studies from Central Canada (Quebec=2, Ontario=32) mapped to the Quadruple Aim. Ten studies reported on patient experience (40–49), two on costs (50,51), three on population health (52–54), and three on provider experience (55–57). Emerging themes from these studies included: need for improved access to care; increased satisfaction with care; increased patient-centeredness; increased costs but improved quality of care; decreased cost of prevention over time with more appropriate provider; positive influence on care quality for health promotion and substance use outcomes; improved provider satisfaction; and need for improved care coordination. 19 studies reported on aspects related to team function. This included determining team members' scope of practice, boundaries, and role responsibilities (56,58–60). Other related themes included: changes in screening and prevention care (61); provider and patient experience with quality of care (50); funding related impacts on team function (52,62); support for information technology, leadership, and education (52,63–65); and physical space or co-location (59,66). One study explored patient and provider satisfaction and relationship building (40).

Atlantic Canada

There was one study from Atlantic Canada (Nova Scotia=1), which did not map to the Quadruple Aim but reported on team function and ongoing interprofessional education to address issues of respect for health professions (67).

Territories and Nunavut

There were no included studies from this region.

Pan-Canadian Studies

There were three Pan-Canadian studies, with one study mapping to patient experience (24). All studies reported on access to care and included process and outcome indicators that were perceived positively in TBC setting such as: patient centeredness, comprehensiveness, and continuity of care (67,68,69).

Table 2. Number of publications by region reporting elements of the Quadruple Aim categories

	Patient Experience	Costs	Population Health	Provider Experience
West Coast	0	0	0	0
Prairies	2	0	1	1
Central Canada	10	2	3	3
Atlantic Canada	0	0	0	0
Territories & Nunavut	0	0	0	0
Pan-Canadian	1	0	0	0
Total	14	2	4	4

Table 3. Number of publications by region reporting elements of the TBPC Evaluation Framework dimensions

	Care Process and Quality	Team Function	Patient Experience	Provider Experience	RCC	Population Health	Health Care Costs	TBC Foundations
West Coast	0	0	0	0	0	0	0	0
Prairies	4	4	2	3	1	2	1	2
Central Canada	14	19	11	3	1	3	2	11
Atlantic Canada	0	1	0	0	0	0	0	0
Territories and Nunavut	0	0	0	0	0	0	0	0
Pan-Canadian	3	0	1	0	0	0	0	0
Total	21	24	14	6	2	5	3	13

Discussion

Our integrative synthesis found many Canadian examples of TBPC evaluation. Ontario has the largest population and the longest TBPC adoption timeframe in Canada and has the majority of included studies. Other smaller provinces and those who are later in the transition to TBPC had fewer evaluation studies; this was expected. The lack of studies that met our criteria from the West Coast was also expected. Although community health centres have been operating in BC for several decades, and there have been a number of shorter-lived initiatives focused on TBPC, our search strategy found very little focused on the outcomes of these efforts. BC is now in the early stages of a new push to TBPC backed by a number of provincially funded initiatives to support the development and implementation of an integrated system of Primary Care Networks and PMHs (16). This is in line with similar efforts in other provinces. As such, we anticipate that the literature focused on aspects of formative evaluation of TBPC in Canada will grow dramatically in the near future.

The gap in literature from Nunavut and the territories was more surprising. A targeted search resulted in a number of articles that describe team-based practices in the North, the use of telehealth and paraprofessionals to support team-based practice, and the challenges facing teams where positions are filled with temporary rotating staff and turnover is high (70,71). This suggests a more targeted exploration of the evaluation of TBPC in Northern and in rural and remote communities as an area for future research.

All articles included in the integrative synthesis are aligned with at least one dimension of the TBPC Evaluation Framework. System transformation in primary care is complex and is a process that occurs over time. Because many provinces are early in this transition, the longitudinal assessment required to assess most elements of the Quadruple Aim are not yet possible or published, which is likely part of the reason why only 51% of studies mapped to the Quadruple Aim. The TBPC Evaluation Framework intentionally has a broader scope supporting formative and summative evaluation. Next, we provide further contextualization of the eight dimensions of the framework and why these are important to measure.

Canadian TBPCC Evaluation – Across the TBPCC Framework Dimensions

Relationship Centred Care (RCC):

In our review, studies demonstrated associations between RCC and improved patient outcomes with emphasis on the importance of communication and collaboration (37,40). There is evidence that skills and behaviours related to collaboration are most likely to show significant effects on patient outcomes (37). Evaluation of RCC is important as relationships can be disrupted in poorly functioning teams.

Patient Experience:

From our review, there is considerable evidence that TBPCC can enhance patient experience of care through strategies related to accessibility, respectful supportive relationships, enhanced opportunities for knowledge sharing, self-management, and community advocacy (24,33,34,40). The availability of enhanced case management or specialized support roles also positively influences patient experience (44,45,72). These benefits are particularly salient for more vulnerable populations (47,65), who feel they are given the chance to ‘tell their story and be heard’ in team-based settings (48).

Provider Experience:

The review suggests that providers can find working in a team very useful, particularly for complex patients (36,57). Providers perceive there is improved access, continuity of care, and patient-centered-ness in TBC (5,44). Communication and shared understanding of roles contributes to enhanced provider experience (35,36,44,57) as does the availability of providers with specific expertise (e.g. mental health/counselling or CDM) (39,55).

Team Function:

Team Function was the most evaluated dimension in the included articles (24/45; 53%). The review underscored the value of proactively supporting effective communication and trusting relationships among team members (36–38,73). Common barriers to collaboration and team function include the time it takes to build relationships, the lack of opportunities for co-location, and challenges with role definition (59,64,66). Despite some studies that suggest only moderate success in the context of interdisciplinary collaboration (63,74), there is ample evidence of the importance of working to develop shared values in primary care teams and the value of efforts to improve group dynamics to support higher levels of interdisciplinary collaboration (5,44,74–76). Working to build understanding of roles and shared leadership is also widely attributed to enhancing collaboration (58,60,61,65). There is also evidence of the value of interprofessional education (67,77). Intentional, team-focused activities, including formal meetings, professional development programs, social activities, and retreats, are essential to sustaining and building relationships needed for highly functioning teams (75,78).

Care Process and Quality:

A number of studies included in our review suggest that TBC leads to improvements in patients' perceptions of quality of care, accessibility of care, knowledge of medical conditions, and their ability to self-manage (24,34,40,44,50,53,72,79). Providers' perceptions of capacity can be enhanced through shared care models and opportunities for interprofessional collaboration (39,48,52,61). However, other studies suggest the accessibility of care is still an issue, even in highly-functioning team-based practices (33,43,46). A pan-Canadian study found that the likelihood of reporting access issues or unmet needs was not significantly different in TBC vs. non-TBC settings (68). However, there is evidence that quality of care, particularly for CDM, is better in team-based practices and particularly in community health centres or practices with blended capitation models (62,69,80).

TBC Foundations:

The most salient issues for teams that emerged from our synthesis are physician remuneration, co-location, interoperable electronic health records, visionary leadership, and educational support (38,39,52,56,62). Larger numbers of physicians on teams and the distribution of teams across sites has been negatively associated with team performance (42,56,59); there is evidence that smaller, co-located teams are more likely to collaborate effectively (66). The physical layout of a space, the presence of coordinator or team management roles, and the use of alternative funding models have been highlighted as foundational to success (56,62,80).

Health of the Population:

TBPCC can improve outcomes in population health (e.g. fewer Emergency Room visits for low acuity) (81,82). Some studies highlight early indicators of improvement in population health through TBPCC (35). For example, one study found that increased accessibility to dietitians resulted in increased likelihood of PCPs discussing nutrition for weight management (52). Another study discovered improved CDM and preventive care in TBPCC (53). An addiction shared care program also showed early success (54).

Health Care Costs:

Physician remuneration is an important issue for interprofessional teams across Canada and is a frequent stumbling block (38). Due to the longitudinal nature of cost savings related to longer-term, expected outcomes, there is a paucity of evidence in this dimension. A study focused on the cost effectiveness of a team-based prevention program for complex patients found that it was both more expensive and more effective than other programs (50). There is also evidence that the integration of new team members becomes more cost effective over time (51).

Limitations

The systematic search strategy limited our initial searches to academic literature only, missing publications in the grey literature. There were no results for Western Canada or Nunavut and the Territories, and only limited results in Atlantic Canada. However, we are aware that at the practice level TBC innovations in primary care are being

implemented in these regions. A more extensive search that includes a focus on grey literature and government publications could address some of the regional gaps highlighted in this synthesis.

Conclusions

There were 23 studies (51%) that mapped to the outcomes of the Quadruple Aim. The broader TBPCC Evaluation Framework was able to map all 45 included articles as it was developed specifically for TBPCC. It considers early and late evaluation needs, and includes dimensions on Relationship Centred Care, Team Function, Care Process and Quality, and TBC Foundations. By encouraging a focus on formative as well as summative evaluation, the TBPCC Evaluation Framework provides a comprehensive approach to assessing the evidence needed to support actionable improvements for TBPCC in Canada.

This review highlights a range of positive outcomes associated with the various dimensions of TBPCC. Across the board the evidence underscores the value of relationships, visionary leadership, efforts to support enhanced collaboration and shared understanding and clear communication in the transition to team-based practice.

Abbreviations

BC	British Columbia
CDM	Chronic Disease Management
FHT	Family Health Team
RCC	Relationship Centred Care
TBC	Team-Based Care
TBPCC	Team-Based Primary and Community Care
PCN	Primary Care Network
PCP	Primary Care Provider
PMH	Patient Medical Home
WHO	World Health Organization

Declarations

Ethics Approval and Consent to Participate: Not Applicable

Consent for Publication: Not Applicable

Availability of data and materials: The dataset generated and analysed during the current study are available from the corresponding author on reasonable request

Competing interests: The Authors declare that they have no competing interests

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Authors' contributions:

SF Completed level 1 reviews and level 2 reviews (with MA); reviewed data extraction and conducted 2nd round of analysis (after PB); developed outline (with MP and MA) and drafted full paper.

PB: Completed level 1 reviews, conducted initial data extraction (into spreadsheet) and completed first round of analysis; developed tables and drafted results section, reviewed and edited all drafts.

TH: Reviewed data extraction tables and full text articles to confirm analysis, formatted, reviewed and edited all drafts.

SM: Assisted in level 1 review, located copies of all the included papers, and initiated the data extraction.

MA: Registered review and set search parameters, completed level 1 and 2 reviews of the included articles, developed outline with SF and MP, reviewed and edited all drafts.

MP: Completed level 1 reviews and resolved conflicts for levels 1, 2, and 3; developed outline with SF and MA, drafted evaluation framework sections of paper and reviewed/edited all drafts.

All authors reviewed and approved the final manuscript.

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References

1. Best A, Greenlagh T, Lewis S, Saul JE, Carroll S, Bitz J. Large-System Transformation in Health Care: A Realist Review. *Milbank Q.* 2012;90(3):421–56.
2. Berwick DM, Nolan TW, Whittington J. The Triple Aim: Care, Health, And Cost. *Health Aff (Millwood).* 2008 May 1;27(3):759–69.
3. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. *Ann Fam Med.* 2014;12(6):573–6.
4. Bourgeault IL, Mulvale G. Collaborative health care teams in Canada and the USA: Confronting the structural embeddedness of medical dominance. *Health Sociol Rev.* 2006 Dec 1;15(5):481–95.
5. Brown JB, Ryan BL, Thorpe C. Processes of patient-centred care in Family Health Teams: a qualitative study. *CMAJ Open.* 2016 Jun 1;4(2):E271–6.
6. College of Family Physicians of Canada. Best Advice: Team-Based Care in the Patient’s Medical Home. [Internet]. 2017 Jul. Available from: <http://bccfp.bc.ca/wp-content/uploads/2015/06/Team-based-Care-in-PMH.pdf>
7. GPSC. Implementation of the Integrated System of Primary and Community Care: Team-based care through Primary Care Networks Guidance to Collaborative Services Committees [Internet]. 2017 [cited 2018 Sep 26]. Available from: <http://www.gpsc.bc.ca/sites/default/files/PMH%20PCN%20CSC%20Guidance%20201712.pdf>
8. Grumbach K, Bodenheimer T. Can Health Care Teams Improve Primary Care Practice? *JAMA.* 2004 Mar 10;291(10):1246–51.
9. Bodenheimer T, Ghorob A, Willard-Grace R, Grumbach K. The 10 Building Blocks of High-Performing Primary Care. *Ann Fam Med.* 2014 Mar 1;12(2):166–71.

10. O'Daniel M, Rosenstein AH. Professional communication and team collaboration. In Patient safety and quality: An evidence-based handbook for nurses 2008 Apr. Agency for Healthcare Research and Quality (US).
11. Schottenfeld L, Petersen D, Peikes D, Ricciardi R, Burak H, McNellis R, Genevro J. Creating patient-centered team-based primary care. Rockville: Agency for Healthcare Research and Quality. 2016 Mar.
12. Helfrich CD, Dolan ED, Simonetti J, Reid RJ, Joos S, Wakefield BJ, et al. Elements of Team-Based Care in a Patient-Centered Medical Home Are Associated with Lower Burnout Among VA Primary Care Employees. *J Gen Intern Med*. 2014 Jul 1;29(2):659–66.
13. Daniel DM, Wagner EH, Coleman K, Schaefer JK, Austin BT, Abrams MK, et al. Assessing Progress toward Becoming a Patient-Centered Medical Home: An Assessment Tool for Practice Transformation. *Health Serv Res*. 2013 Dec 1;48(6pt1):1879–97.
14. Rosser WW, Colwill JM, Kasperski J, Wilson L. Progress of Ontario's Family Health Team Model: A Patient-Centered Medical Home. *Ann Fam Med*. 2011 Mar 1;9(2):165–71.
15. Nutting PA, Crabtree BF, Miller WL, Stange KC, Stewart E, Jaén C. Transforming Physician Practices To Patient-Centered Medical Homes: Lessons From The National Demonstration Project. *Health Aff (Millwood)*. 2011 Mar 1;30(3):439–45.
16. Ministry of Health. 2018/19=2020/21 Service Plan [Internet]. 2018 Feb. Available from: <http://bcbudget.gov.bc.ca/2018/sp/pdf/ministry/hlth.pdf>
17. Alberta Medical Assoc,. PCN evolution: Vision and framework. Report to the Ministry of Health. [Internet]. 2013. Available from: <http://www.pcnpmo.ca/pcnevolution/Overview%20Documents/EvolutionVisionandFramework.pdf>.
18. Ouimet M-J, Pineault R, Prud'homme A, Provost S, Fournier M, Levesque J-F. The impact of primary healthcare reform on equity of utilization of services in the province of Quebec: a 2003–2010 follow-up. *Int J Equity Health*. 2015 Dec 14;14(1):139.
19. Flieger SP. Implementing the patient-centered medical home in complex adaptive systems: Becoming a relationship-centered patient-centered medical home. *Health Care Manage Rev*. 2017;42(2):112–21.
20. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: a multidisciplinary review. *Br Med J [Internet]*. 2003;327. Available from: <https://doi.org/10.1136/bmj.327.7425.1219>
21. Jackson GL, Powers BJ, Chatterjee R, Prvu Bettger J, Kemper AR, Hasselblad V, et al. The Patient-Centered Medical Home: A Systematic Review. *Ann Intern Med*. 2013 Feb 5;158(3):169.
22. Nielsen M, Buelt L, Patel K, Nichols LM, Fund MM. The patient-centered medical home's impact on cost and quality. *Annual review of evidence*. 2014;2015:202014-15.
23. WHO | Framework for action on interprofessional education and collaborative practice [Internet]. WHO. [cited 2018 Feb 19]. Available from: http://www.who.int/hrh/resources/framework_action/en/
24. Jesmin S, Thind A, Sarma S. Does team-based primary health care improve patients' perception of outcomes? Evidence from the 2007–08 Canadian Survey of Experiences with Primary Health. *Health Policy*. 2012 Apr 1;105(1):71–83.
25. Nutting PA, Crabtree BF, Miller WL, Stange KC, Stewart E, Jaén C. Transforming Physician Practices To Patient-Centered Medical Homes: Lessons From The National Demonstration Project. *Health Aff (Millwood)*. 2011 Mar 1;30(3):439–45.

26. Stange KC, Nutting PA, Miller WL, Jaén CR, Crabtree BF, Flocke SA, et al. Defining and Measuring the Patient-Centered Medical Home. *J Gen Intern Med.* 2010 Jun 1;25(6):601–12.
27. Price M, Lau F. The clinical adoption meta-model: a temporal meta-model describing the clinical adoption of health information systems. *BMC Med Inform Decis Mak.* 2014 May 29;14(1):43.
28. Welch V, Petticrew M, Tugwell P, Moher D, O'Neill J, Waters E, et al. PRISMA-Equity 2012 extension: reporting guidelines for systematic reviews with a focus on health equity. *PLoS Med.* 2012;9(10):e1001333.
29. Health Canada. Primary health care and health system renewal [Internet]. aem. 2005 [cited 2018 Feb 15]. Available from: <https://www.canada.ca/en/health-canada/services/primary-health-care/primary-health-care-health-system-renewal.html>
30. Dixon-Woods M, Cavers D, Agarwal S, Annandale E, Arthur A, Harvey J, et al. Conducting a critical interpretive synthesis of the literature on access to healthcare by vulnerable groups. *BMC Med Res Methodol.* 2006 Jul 26;6(1):35.
31. Fiscella K, McDaniel SH. The complexity, diversity, and science of primary care teams. *Am Psychol.* 2018 May;73(4):451–67.
32. Dixon-Woods M, Agarwal S, Jones D, Young B, Sutton A. Synthesising qualitative and quantitative evidence: A review of possible methods. *J Health Serv Res Policy.* 2005 Jan 1;10(1):45–53.
33. Shaw M, Rypien C, Drummond N, Harasym P, Nixon L. Seniors' perspectives on care: a case study of the Alex Seniors health clinic, Calgary. *BMC Res Notes.* 2015;8(1):53.
34. Szafran O, Kennett SL, Bell NR, Green L. Patients' perceptions of team-based care in family practice: access, benefits and team roles. *J Prim Health Care.* 2018 Oct 4;10(3):248–57.
35. Farris KB, Côté I, Feeny D, Johnson JA, Tsuyuki RT, Brilliant S, Dieleman S. Enhancing primary care for complex patients. Demonstration project using multidisciplinary teams. *Canadian Family Physician.* 2004 Jul 1;50(7):998-1003.
36. Dieleman SL, Farris KB, Feeny D, Johnson JA, Tsuyuki RT, Brilliant S. Primary health care teams: team members' perceptions of the collaborative process. *J Interprof Care.* 2004 Feb 1;18(1):75–8.
37. Gaboury I, Lapierre LM, Boon H, Moher D. Interprofessional collaboration within integrative healthcare clinics through the lens of the relationship-centered care model. *J Interprof Care.* 2011 Mar 1;25(2):124–30.
38. Misfeldt R, Suter E, Mallinson S, Boakye O, Wong S, Nasmith L. Exploring Context and the Factors Shaping Team-Based Primary Healthcare Policies in Three Canadian Provinces: A Comparative Analysis. *Healthc Policy Polit Sante.* 2017 Aug;13(1):74–93.
39. Beaulac J, Edwards J, Steele A. Formative evaluation of practice changes for managing depression within a Shared Care model in primary care. *Prim Health Care Res Dev.* 2017;18(1):50–63.
40. Shaw SN. More than one dollop of cortex: Patients' experiences of interprofessional care at an urban family health centre. *J Interprof Care.* 2008;22(3):229–37.
41. Hudon C, Lambert M, Almirall J. Physician Enabling Skills Questionnaire: Validation of a newly developed instrument in primary health care., Physician Enabling Skills Questionnaire: Validation d'un outil récemment développé en contexte de soins primaires. *Can Fam Physician Med Fam Can Can Fam Physician.* 2015 Nov;61, 61(11, 11):e517, e517-23.
42. Carroll JC, Talbot Y, Permaul J, Tobin A, Moineddin R, Blaine S, Bloom J, Butt D, Kay K, Telner D. Academic family health teams: Part 1: patient perceptions of core primary care domains. *Canadian Family Physician.*

2016 Jan 1;62(1):e23-30.

43. Carroll, J. C., Talbot, Y., Permaul, J., Tobin, A., Moineddin, R., Blaine, S., ... & Telner, D. (2016). Academic family health teams: Part 2: patient perceptions of access. *Canadian family physician*, 62(1), e31-e39
44. Conn LG, Oandasan IF, Creede C, Jakubovicz D, Wilson L. Creating Sustainable Change in the Interprofessional Academic Family Practice Setting: An Appreciative Inquiry Approach. *J Res Interprofessional Pract Educ* [Internet]. 2010 Nov 18 [cited 2018 Oct 12];1(3). Available from: <https://www.jripe.org/jripe/index.php/journal/article/view/29>
45. Cordeiro K, Foroughe M, Mastorakos T. Primary Mental Health Care in the Family Health Team Setting: Tracking Patient Care from Referral to Outcome. *Can J Commun Ment Health*. 2015 Aug 26;34(3):51–65.
46. Howard M, Agarwal G, Hilts L. Patient satisfaction with access in two interprofessional academic family medicine clinics. *Fam Pract*. 2009 Oct 1;26(5):407–12.
47. Smith-Carrier T, Sinha SK, Nowaczynski M, Akhtar S, Seddon G, Pham T. It 'makes you feel more like a person than a patient': patients' experiences receiving home-based primary care (HBPC) in Ontario, Canada. *Health Soc Care Community*. 2017;25(2):723–33.
48. Tracy CS, Bell SH. Innovative model of interprofessional primary care for elderly patients with complex health care needs. *Can Fam Physician*. :8.
49. Wetmore S, Boisvert L, Graham E, Hall S, Hartley T, Wright L, Hammond JA, Ings H, Lent B, Pawelec-Brzychczy A, Valiquet S. Patient satisfaction with access and continuity of care in a multidisciplinary academic family medicine clinic. *Canadian Family Physician*. 2014 Apr 1;60(4):e230-6.
50. Gray D, Armstrong CD, Dahrouge S, Hogg W, Zhang W. Cost-effectiveness of anticipatory and preventive multidisciplinary team care for complex patients: evidence from a randomized controlled trial. *Canadian Family Physician*. 2010 Jan 1;56(1):e20-9.
51. Hogg WE, Zhao X, Angus D, Fortier M, Zhong J, O'Sullivan T, et al. The cost of integrating a physical activity counselor in the primary health care team. *J Am Board Fam Med*. 2012;25(2):250–2.
52. Aboueid S, Bourgeault I, Giroux I. Nutrition and obesity care in multidisciplinary primary care settings in Ontario, Canada: Short duration of visits and complex health problems perceived as barriers. *Prev Med Rep*. 2018 Jun 1;10:242–7.
53. Hogg W, Lemelin J, Dahrouge S, Liddy C, Armstrong CD, Legault F, Dalziel B, Zhang W. Randomized controlled trial of anticipatory and preventive multidisciplinary team care: for complex patients in a community-based primary care setting. *Canadian family physician*. 2009 Dec 1;55(12):e76-85.
54. Kahan M, Wilson L, Midmer D, Ordean A, Lim H. Short-term outcomes in patients attending a primary care-based addiction shared care program. *Canadian Family Physician*. 2009 Nov 1;55(11):1108-9.
55. Farrar S, Kates N, Crustolo AM, Nikolaou L. Integrated model for mental health care. Are health care providers satisfied with it?. *Canadian Family Physician*. 2001 Dec 1;47(12):2483-8.
56. Goldman J, Meuser J, Rogers J, Lawrie L, Reeves S. Interprofessional collaboration in family health teams: an Ontario-based study. *Canadian Family Physician*. 2010 Oct 1;56(10):e368-74.
57. Moore AE, Nair K, Patterson C, White J, House S, Kadhim-Saleh A, et al. Physician and Nurse Perspectives of an Interprofessional and Integrated Primary Care-Based Program for Seniors. *J Res Interprofessional Pract Educ* [Internet]. 2013 Mar 27 [cited 2018 Oct 12];3(1). Available from: <https://www.jripe.org/jripe/index.php/journal/article/view/95>

58. Kotecha J, Brown JB, Han H, Harris SB, Green M, Russell G, et al. Influence of a quality improvement learning collaborative program on team functioning in primary healthcare. *Fam Syst Health*. 2015 Sep;33(3):222–30.
59. Legault F, Humbert J, Amos S, Hogg W, Ward N, Dahrouge S, et al. Difficulties Encountered in Collaborative Care: Logistics Trumps Desire. *J Am Board Fam Med*. 2012 Mar 1;25(2):168–76.
60. MacNaughton K, Chreim S, Bourgeault IL. Role construction and boundaries in interprofessional primary health care teams: a qualitative study. *BMC Health Serv Res*. 2013 Nov 24;13(1):486.
61. Harris SB, Green ME, Brown JB, Roberts S, Russell G, Fournie M, et al. Impact of a quality improvement program on primary healthcare in Canada: A mixed-method evaluation. *Health Policy*. 2015 Apr 1;119(4):405–16.
62. Kiran T, Kopp A, Moineddin R, Glazier RH. Longitudinal evaluation of physician payment reform and team-based care for chronic disease management and prevention. *Can Med Assoc J*. 2015 Nov 17;187(17):E494–502.
63. Sibbald SL, McPherson C, Kothari A. Ontario primary care reform and quality improvement activities: an environmental scan. *BMC Health Serv Res*. 2013 Jun 10;13:209.
64. Smith-Carrier T, Neysmith S. Analyzing the Interprofessional Working of a Home-Based Primary Care Team*. *Can J Aging Rev Can Vieil*. 2014 Sep;33(3):271–84.
65. Smith-Carrier T, Pham T-N, Akhtar S, Nowaczynski M, Seddon G, Sinha S. “A More Rounded Full Care Model”: Interprofessional Team Members’ Perceptions of Home-Based Primary Care in Ontario, Canada. *Home Health Care Serv Q*. 2015 Oct 2;34(3–4):232–51.
66. Oandasan IF, Conn LG, Lingard L, Karim A, Jakubovicz D, Whitehead C, et al. The impact of space and time on interprofessional teamwork in Canadian primary health care settings: implications for health care reform. *Prim Health Care Res Dev*. 2009 Apr;10(2):151–62.
67. Sargeant J, Loney E, Murphy G. Effective interprofessional teams: “Contact is not enough” to build a team. *J Contin Educ Health Prof*. 2008 Sep 1;28(4):228–34.
68. Zygmunt A, Asada Y, Burge F. Is team-based primary care associated with less access problems and self-reported unmet need in Canada? *Int J Health Serv*. 2017;47(4):725–51.
69. Zygmunt A, Berge F. Inter-provincial variation and determinants of access to team-based primary care in Canada. *Dalhous Med J*. 2014;41(1).
70. McCarthy K. Understanding the challenges, witnessing primary health care in action. *The Canadian nurse*. 2006 Apr 1;102(4):9.
71. Minore B, Boone M. Realizing potential: improving interdisciplinary professional/paraprofessional health care teams in Canada’s northern aboriginal communities through education. *J Interprof Care*. 2002;16(2):139–47.
72. Hudon C, Chouinard M-C, Dubois M-F, Roberge P, Loignon C, Tchouaket É, et al. Case Management in Primary Care for Frequent Users of Health Care Services: A Mixed Methods Study. *Ann Fam Med*. 2018 May;16(3):232–9.
73. Brown JB, Lewis L, Ellis K, Stewart M, Freeman TR, Kasperski MJ. Mechanisms for communicating within primary health care teams. *Canadian Family Physician*. 2009 Dec 1;55(12):1216-22.
74. Sicotte C, D’Amour D, Moreault M-P. Interdisciplinary collaboration within Quebec community health care centres. *Soc Sci Med*. 2002 Sep 1;55(6):991–1003.

75. Brown JB, Lewis L, Ellis K, Beckhoff C, Stewart M, Freeman T, et al. Sustaining primary health care teams: What is needed? *J Interprof Care*. 2010 Jul;24(4):463–5.
76. Brown SR, Irwin G. Measuring and Improving Continuity in Residency Primary Care Practice. *Ann Fam Med*. 2018 May 1;16(3):273–4.
77. Manca DP, Greiver M, Carroll JC, Salvalaggio G, Cave A, Rogers J, et al. Finding a BETTER way: A qualitative study exploring the prevention practitioner intervention to improve chronic disease prevention and screening in family practice. *BMC Fam Pract*. 2014 Apr 11;15(1):66.
78. Brown JB, Ryan BL, Thorpe C, Markle EKR, Hutchison B, Glazier RH. Measuring teamwork in primary care: Triangulation of qualitative and quantitative data. *Fam Syst Health*. 2015 Sep;33(3):193–202.
79. Vingilis E, Paquette-Warren J, Kates N, Crustolo A-M, Greenslade J, Psych B, et al. Descriptive and Process Evaluation of a Shared Primary Care Program. 2007;10.
80. Liddy C, Singh J, Hogg W, Dahrouge S, Taljaard M. Comparison of primary care models in the prevention of cardiovascular disease - a cross sectional study. *BMC Fam Pract*. 2011 Oct 18;12(1):114.
81. Cross-Barnet C, Ruiz S, Skillman M, Dhopeshwarkar R, Singer R, Carpenter R, Campanella S, Freij M, Snyder L, Colligan E. Higher quality at lower cost: Community health worker interventions in the health care innovation awards. *Journal of Health Disparities Research and Practice*. 2018;11(2):10.
82. Reddy A, Wong E, Canamucio A, Nelson K, Fihn SD, Yoon J, et al. Association between Continuity and Team-Based Care and Health Care Utilization: An Observational Study of Medicare-Eligible Veterans in VA Patient Aligned Care Team. *Health Serv Res [Internet]*. 2018 Sep 11 [cited 2018 Oct 1];0(0). Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1111/1475-6773.13042>

Figures

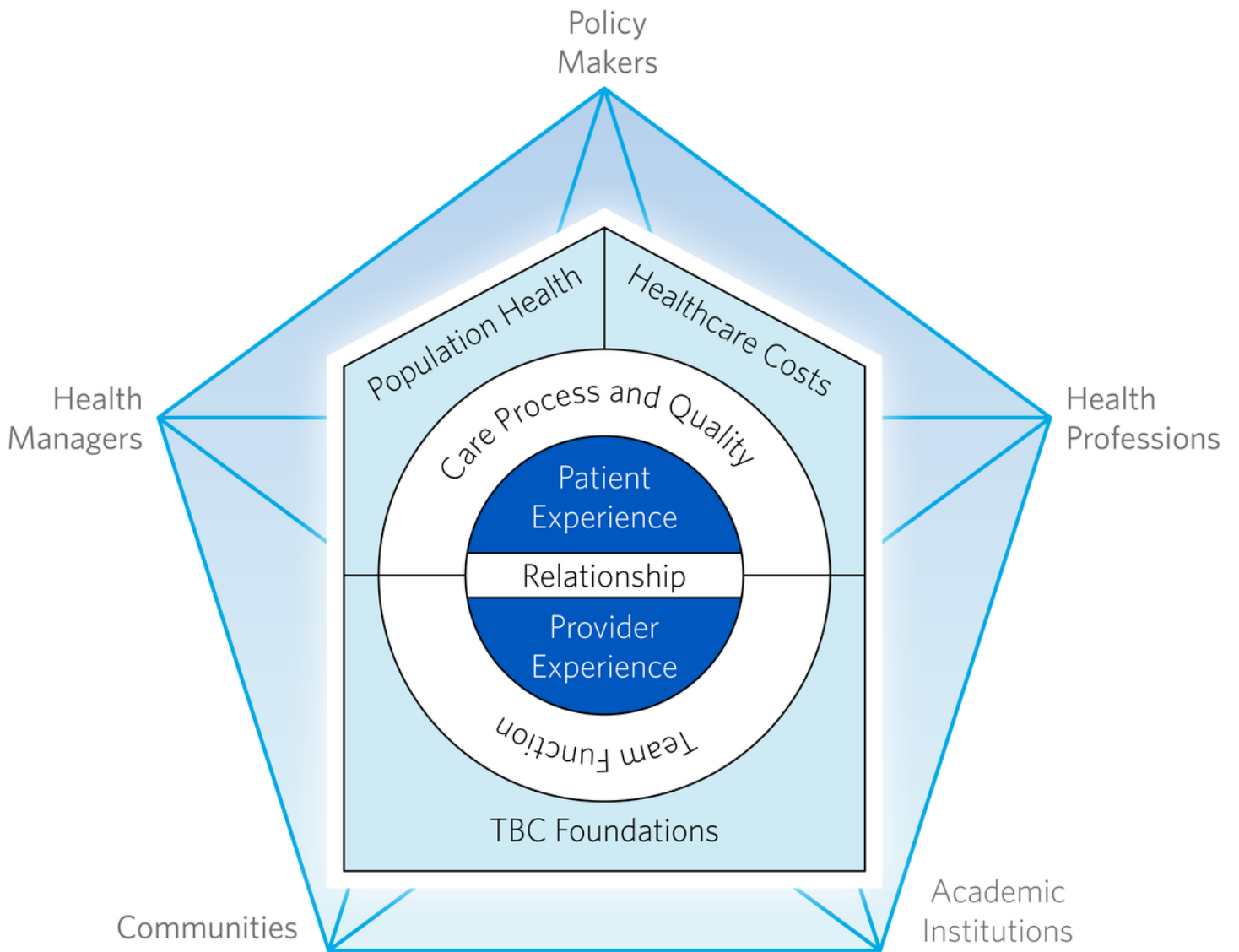


Figure 1

TBPC Evaluation Framework

For each Dimension, consider evolution of indicators over time

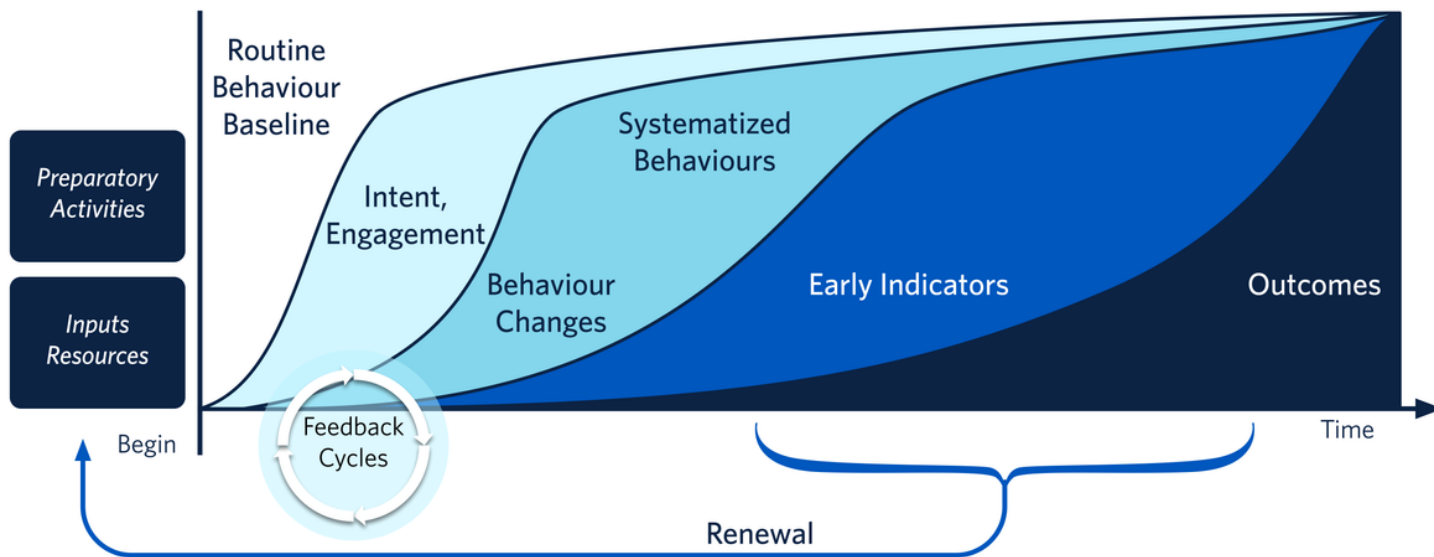


Figure 2

TBPCC Adoption Model

Supplementary Files

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- [PRISMA2009checklist.doc](#)