

High Performance Teams in Primary Care: The Basis of Interdisciplinary Collaborative Care

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One of the fundamental challenges of Primary Health Care Reform is the establishment of collaborative health care teams to meet the needs of patients and society in a timely and efficient manner. The predominant model for primary health care delivery in Canada consists of a family physician or general practitioner working in a private office either in solo or group practice with one or more office staff. Other professionals may be part of the office team; most professionals however, are usually accessed through other agencies such as the Community Care Access Centre or local Health Units resulting in virtual teams or networks of providers that may or may not function collaboratively. It is believed that health care outcomes will be improved by effective interprofessional collaboration. Primary care reform in Ontario was initiated with the development of Family Health Networks in 2001 which joined family physicians and their practices to deliver care to defined populations. The initiative is now extending to the development of Family Health Teams (FHTs) involving a variety of health care professionals. The framework documents provide guidance on the structure and characteristics of well-functioning teams. (Ontario MOHLTC, 2005) Much of the theory regarding well functioning teams is a result of studies in self-managing work teams but there is little research about the dynamics, benefits and development of high performance professional teams (Beatty, 2003) and there are few studies examining primary care team function. (San Martin-Rodriguez et al., 2005)

San Martin-Rodriguez and colleagues recently reviewed the literature to identify the determinants of successful collaboration in health care. (San Martin-Rodriguez et al., 2005) Factors at the interpersonal, organizational and environmental (systemic) levels determine the success of efforts to develop collaboration. Much of the scientific literature is based in organizational theory and organizational sociology. Research on collaboration in health care has been focused at the interpersonal level in hospital settings and indicates that collaboration is essentially an interpersonal process that requires both willingness and skills to be successful. (San Martin-Rodriguez et al., 2005)

Much of the guidance for health care team development focuses on structural and behavioural elements. (Cott, 1997) Millward and Jeffries (2001) suggest that the focus on behavioural elements tends to be context specific and may not be transferable. They propose that a competent or self-regulating team has transferable skills allowing it to respond flexibly to task demands and contextual changes. Millward and Purvis (2001) proposed a model of team effectiveness that includes understanding the metacognitive factors and motivational factors that underlie effective team self-regulation. They suggest that these variables, if constant across different situations, could be used to develop interventions that would be long-lasting and transferable.

To operationalize this model, they developed a theoretically based survey using a Cognitive Motivational Model of Team Effectiveness that includes shared mental models, team meta-cognition, team identification and team potency. (Millward and Jeffries, 2001)

Shared Mental Models

Cannon-Bowers and colleagues (1990) define mental models as: “that which allows individuals to form explanations and expectations of events so that they can decide upon the appropriate action to adopt”. (Millward & Jeffries, 2001, 277) Practice and experience facilitate the development of cognitive representations of the team task, the team (teammates' knowledge, skills, abilities, preferences and tendencies) and of team interaction (roles and responsibilities, interaction and communication patterns, role interdependencies and information sources). If individual members' representations of task, team and team interaction overlap, a shared mental model exists, enabling them to predict and anticipate the needs and contributions of their members. Thus, the more 'shared knowledge' a team has, the better their teamwork potential. (Cannon-Bowers, Salas & Converse, 1990)

Team Meta-cognition

Team meta-cognition is the ability of the team to self-regulate through a sound knowledge of itself (its roles, objectives, strengths and weaknesses) and be able to reflect, review and subsequently refine or correct its knowledge and practices. (Millward and Purvis, 1998) Millward and Purvis (1998) identify two important aspects of team motivation: identity and potency. Team identity in contrast to individual identity implies that the individual's self-concept and esteem is related to the team's success over personal success. Team potency, is the collective belief that the team can succeed and be effective. (Guzzo, 1986).

Millward and Ramsay (1998) used these theoretical concepts to develop a survey tool, first used in industry and subsequently in the health care field in Britain. (Millward and Jeffries, 2001) The Team Survey® was found to have acceptable psychometric properties in the National Health Service population. In our study we were interested in whether understanding team self-concepts would shed light on the underlying characteristics of high performing professional teams. As a first step, we investigated whether the Team Survey® (<http://www.blackwell-synergy.com/doi/abs/10.1046/j.1365-2648.2001.01844.x>) developed by Millward and Jeffries (2001) for the National Health Service (NHS) in Britain was valid and reliable for use in predicting primary care team effectiveness in the Canadian health care context.

Background

The Department of Family Medicine at Queen's University responded to the offer of the Ontario Ministry of Health and Long Term Care (MOHLTC) in 2002 to become a Family Health Network. This initiative changes the way patients are registered; requires 24-hour, seven-days a week access to care; provides support for the introduction of an electronic medical record; and provides incentives to meet certain preventative targets and service delivery for the practice population. Further reforms include the introduction of Family Health Care Teams with the aim of improving patient care through collaborative health care teams. (Ontario MOHLTC, 2005) These changes may change the way teams are structured and interact and provide an opportunity to address team effectiveness.

Setting

The Queen's University Department of Family Medicine consists of six practice teams, each with 2-3 physicians, one registered nurse (RN) or registered practical nurse (RPN) and a shared receptionist. All teams provide teaching practices to medical and nursing students and include doctors-in-training for 4 month blocks. Six secretaries, a Nurse Practitioner, two float RPNs, a nutritionist, two social workers, two liaison psychiatrists, a switchboard operator and six administrative staff support the practice teams. Each practice team operates autonomously yet all members of the team contribute to the overall clinical deliverables and teaching mission of the Department. In addition, there are five to seven research assistants, depending on number of projects in the Centre for Studies in Primary Care, the research division of the Department.

Methods and materials

All members of the Department of Family Medicine were invited to participate. Members were asked to join the teams with which they were affiliated. Thus a person might participate with a clinic team including a mix of professionals and support staff, a research team and with a professional team (i.e., nursing team). Teams were asked to indicate a date that most members could meet and attendance was recorded. Absent members were offered an opportunity to complete the surveys at a later date. The study was approved by the Health Sciences Research Ethics Board at Queen's University.

Teams were briefed at the meeting on the purpose and process of the study, ensured it was completely voluntary, and informed consent was obtained. (Appendix 1) All participants were asked to complete the Team Survey®. Team functioning was assessed by all participants and an external assessment of team functioning was provided by an administrative assistant who supervised receptionists for every team. (Appendix 2, Millward and Jeffries, 2001)

Analysis

SPSS 11.0 (SPSS Inc., Chicago, Illinois) principal axis factor analysis was used to determine the factor structure of the Team Survey®. Regression analysis, with “team effectiveness” as the dependent variable, and the factors as independent variables, was used to determine the factors that predicted team effectiveness.

Results

Nine team meetings were held through December 2004 to January 2005. Table 1 shows the type of team and the members affiliated with each. Of the 30 staff (secretary, receptionist) and 20 professionals (physician, researcher, float nurse, residents, and allied health professionals) 65 responses were obtained from 44 individuals including four doctors-in-training. Practice teams included students and doctors-in-training at their own discretion. As four surveys did not include identification data, 61 responses were included in the analysis.

Table 1: Teams and members participating

Team	Designation							Total
	RN	physician	research	secretary	reception	float nurse	resident	
Clinic 1	1	2	0	2	1	0	0	6
Clinic 2	1	3	0	3	1	0	2	10
Reception	0	0	0	0	6	0	0	6
Admin	0	0	0	4	0	0	0	4
Nursing	8	0	0	0	0	1	0	9
Research	1	1	4	1	0	0	0	7
Clinic 3	1	3	0	1	1	0	2	8
Clinic 4	2	1	0	1	2	1	0	7
Clinic 5	2	1	0	1	2	1	0	7
Clinic 6	0	1	0	0	0	0	0	1
Total	16	12	4	13	13	3	4	65

Construct Validity

Principal axis factor analysis was used to determine the degree of construct validity. The initial analysis revealed a nine factor solution using all 43 items. As there were less than 100 subjects, a critical value was determined to be at 0.67 at the .001 level of probability and 0.51 at the .05 level of probability. Items with commonalities below 0.51 were dropped leaving 26 items. A four factor solution explaining 69.2% of the variance converged in six iterations with varimax rotation. (Table 2) Factor 1 accounted for 45.9% of the variance and comprised 11 items with the highest loading items concerning team identification and communication. Factor 2 with eight items accounted for 9.3% of the variance. The highest loading items concerned metacognition about team goals and performance. Factor 3 with four items concerning team potency accounted for 8.6% of the variance and Factor 4 with three items addressing shared mental models about team roles accounted for 5.2% of the variance. (Table 3)

Reliability

The internal consistency of items comprising each factor was assessed using Cronbach's alpha based on standardized items. These were 0.95 for Factor 1, 0.90 for Factor 2, 0.84 for Factor 3 and 0.78 for Factor 4.

Regression Analysis

Team effectiveness, the dependent variable was determined as an average score of the four items in Appendix 2. The first two items consider the team itself and the other two items concern the team's interaction with the organization. Regression analysis with the Enter method and subsequently with all four factors entered showed that the model accounted for 60% of the variance. (R^2 0.60, $F= 21.15$, $p < .001$, $d.f.= 4$) Team effectiveness was significantly predicted by three of the four factors. The most important predictor was *Metacognition of team goals and performance*, ($\beta=0.47$, $p < .001$) followed by *Team identification and communication* ($\beta=0.42$, $p < .001$) and *Team potency* ($\beta=0.40$, $p < .001$). *Shared mental models of team members' actions* did not predict team effectiveness in this sample. (Table 4)

Table 2: Rotated Factor Structure of Team Survey®

Item	Factor 1	Factor 2	Factor 3	Factor 4
TI1	0.854			
TI2	0.852			
PER2	0.772			
TI5	0.764			
CM6	0.739			
CM2	0.721			
SMM13	0.692			
VAL1	0.673			
SMM2	0.659			
CM1	0.645			
SMM11	0.555	0.505		
TP8	0.517	0.594		
T18		0.716		
CM4		0.694		
MCG2		0.673		
CM3		0.663		
MCG1		0.603		
MCG3		0.541		
TP3		0.582	0.703	
TP4			0.696	
TP6			0.574	
TP7			0.555	
SMM9				0.790
SMM1				0.712
SMM10				0.696
TP2	0.511	0.338	0.468	-0.089
T17	0.392	0.441	0.067	-0.179

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

Table 3: Factor items with item mean scores and SD

Factor 1	Team identification and communication	Mean	Std. Deviation
TI1	I am proud to belong to this team	6.25	.912
TI2	It is important to me that I am a member of this team	6.18	1.338
TI5 (-)	I feel that it puts me at a disadvantage to be a member of this team	6.56	1.035
CM1	Team members act upon the information I communicate to them	5.54	1.196
CM2	I am able to communicate effectively with team members	5.81	1.231
CM6	I act upon the information that other members of the team communicate to me	6.28	.774
SMM2	The other team members understand my role in the team	5.77	1.310
SMM11	The team adapts its behaviours to meet the needs of other team members	5.12	1.477
SMM13	The team takes into consideration the capabilities of its members	5.51	1.104
PER2	This team believes it is important to consider the perspectives of all its members	5.70	1.309
VAL1	I believe other team members value my contribution to our work	5.68	1.298
Factor 2	Metacognition of team goals and performance	Mean	Std. Deviation
TI8(-)	I see myself as having very different views from other team members	4.86	1.674
CM3	This team has agreed methods for communication	5.21	1.411
CM4(-)	Communication between team members is unclear	5.21	1.688
MCG1	All team members are clear about the overall goals of the team	5.21	1.473
MCG2	I hold the same opinion as other team members about how well the team is performing	4.72	1.161
MCG3	The team is clear about how it contributes to the overall business	5.25	1.491
TP8	This team has the capability to work well together	5.93	1.147
Factor 3	Team Potency	Mean	Std. Deviation
TP3(-)	This team has little confidence in itself	5.97	1.337
TP4	This team believes it can be very productive	5.91	.978
TP6	This team can get a lot done when it works hard	6.41	.702
TP7(-)	This team does not expect to have a lot of influence	5.33	1.648
Factor 4	Shared Mental Models of team actions and roles	Mean	Std. Deviation
SMM1	If asked I could explain all of the roles in the team and how they overlap	5.16	1.405
SMM9(-)	I would usually find it difficult to predict what other team members may do in a particular situation	4.89	1.392
SMM10	I can usually predict what my team members will do in a particular situation	5.08	1.159

Table 4: Prediction of team functioning by team factor scores

	Standardized Coefficients	t	Sig.
	Beta		
(Constant)		69.467	.000
Factor 1 Team identification and communication	.417	4.809	.000
Factor 2 Metacognition of team goals and performance	.469	5.318	.000
Factor 3 Team potency	.396	4.482	.000
Factor 4 Shared Mental Models of Team roles	-.020	-.232	.818

Discussion

In this preliminary study of the Team Survey® adapted from industry for the British National Health Service (NHS) by Millward and Jeffries (2001) we found four factors with acceptable reliability construct and content validity, three of which predicted team effectiveness in primary care teams in an academic Department of Family Medicine in Canada. The four factors related to team identification and communication, metacognition of team roles, team potency and shared mental models. The composition of the factors differed from those found in the NHS sample and from the theoretical constructs of the original survey. This may reflect differences in the composition of the teams studied or organizational or systemic factors. We included research teams, uni-professional teams and mixed clinical teams including both support staff and professional staff. These groups may think about teams differently. Subanalysis with larger samples may determine different factors for different groups.

Team identification and communication, accounting for most of the variance, included items from a number of the theoretical subscales. Items in this factor reflect a personal sense of belonging to the team, good communication and utilization and valuing of team members and their roles. The items reflect a sense of relationship with the team and team members. This factor was the second strongest predictor of team effectiveness.

Metacognition of team goals and performance included items from the metacognitive subscale and items from other scales that relate to knowledge of team goals and operation. This factor was the strongest predictor of team function and supports the theory that team effectiveness is related to a sound knowledge of the team including its goals and motivation.

Team potency included only items from the team potency scale that reflect capability of the team to work hard but not the items related to problem solving or providing quality service. This may reflect the orientation of support staff who do not feel empowered to make decisions. (Cott, 1997) The final item from the team potency scale loaded complexly on the first two factors related to team identification and metacognition. The ability of the team to work hard and be productive predicted team effectiveness.

Only three items from the Shared Mental Models (SMM) scale loaded on the fourth factor and these did not predict team effectiveness in this sample. The items in this factor related to 'predicting or knowing team members' roles and actions.' Other items from the SMM scale that reflected 'consideration of others' loaded on *Team identification and communication*. Thus predicting actions seem less relevant to team effectiveness than relationship factors in this sample.

The different factor loadings from the theoretical models may reflect the interpretation of the items by participants. The shared mental models, thought to be important by Cannon-Bowers (1990) loaded on different factors, with items related to reflections of belonging to the team and perceptions of one's role in the team on *Team identity and communication* contrasted with items related to predicting other team members behaviours on a factor we named *Shared mental models*. Similarly, items from the other scales loaded in relation to items that reflected different aspects of the theoretically derived subscales. Further analysis of the survey with other groups and larger numbers will be needed to determine which factors are stable. In addition, of the three factors that predicted team effectiveness, team identity and team potency are important aspects of team motivation and team metacognition. (Millward and Ramsay, 1998) The orthogonal solution presented here was chosen as no solution was found with an oblique rotation in 25 iterations. Millward and Jeffries (2001) found interdependence of the factors. Future analysis of the tool with larger samples may determine the extent of the correlation between factors.

The purpose of this study was to assess the utility of the tool and initial results lend insight into factors that may be important in primary care teams. Other aspects of the study will be reported separately, however, for the purposes of this analysis it is interesting to consider which teams participated. Teams that did not participate may not be functioning well and the lack of allied health professional participants other than nurses may reflect organizational issues. Currently, allied health professionals

operate primarily as consultants rather than integrated team members. Understanding how the allied health professionals participate in teams will be important future research as the Family Health Team is organized. In addition, the teams in this study were colocated and no virtual teams were included. In primary care, health professionals may work primarily with their office team, but to deliver comprehensive patient care, they must work in virtual teams whose composition will vary depending on the patient and their problems at a particular time. Factors relating to team potency and relationships may be more important in this setting than in health care settings where technical skills are essential for team function, such as the operating room. Future work should include virtual and technically skilled teams as there may be different factors that are important predictors of effectiveness in different settings.

Limitations

The teams were able to self identify and thus some teams may not have participated. In addition, the nurses in the clinic teams were asked to organize their team meetings. This led to variation in considering learners, secretaries or float nurses as members of the teams. Only two teams invited doctors-in-training to participate. The mental health team did not meet, excluding an important component of the multi-professional group.

Some teams did not participate or had only a few members participate. It may be that these teams were less effective and thus the results may not fully reflect the variation in team effectiveness. The outcome measure of team effectiveness was a subjective rating. Determining an accurate, reliable and objective outcome measure is problematic. Researchers use a variety of measures: patient satisfaction, access to care measures, quality measures and cost-effectiveness measures. Each approach measures a different aspect of care and presents certain limitations. Patient satisfaction tends to show little variation and may be dependent on individual relationships. Time was a limiting factor in this study. Using the method followed by Millward and Jefferies (2001) we asked an administrator to evaluate teams effectiveness and found very little variation and poor correlation when compared to participant assessments of team effectiveness. In choosing the participant evaluation of team effectiveness we used a measure at the individual level of analysis and risked overestimating the predictive value of the factors.

Similar to the findings by Millward and Jeffries, the factor analysis did not reflect the theoretical constructs of the tool. As well, we have similar factors of team potency, team identification and shared mental models but the items that loaded on the factors were different. This may be due to cultural, organization or system factors, although, the small sample in both studies may have led to biased results. Over 100 subjects are required to stabilize the factor analysis. Further data collection in Canada is needed to clarify this issue.

Future

The focus group discussions regarding the tool and team functioning will be analyzed using qualitative methods. The Team Survey® tool requires further testing with primary care teams in other settings and with virtual teams to determine its generalizability. If the factors identified in this study continue to predict team effectiveness, then interventions could be directed at improving team metacognition and motivation with the expectation that these are not task or context specific.

Conclusion

The Team Survey® revealed four factors with acceptable reliability, content and construct validity in the setting of an academic family medicine department in Canada. Three of the factors predicted team effectiveness; *Metacognition of team goals and performance*; *Team identification and communication*; and *Team potency*. *Shared mental models of team members' actions and roles* did not predict team effectiveness in this sample.

Appendix 1: Information and Consent Form

You are being invited to participate in a research study that will investigate high performance teams in primary care. The study is being conducted by a group of family doctors and other investigators at Queen's University. The name of the study is High Performance Teams in Primary Care: The basis of interdisciplinary collaborative care

You are eligible to take part in this study if your work is part of a primary health care team.

In this study we are hoping to identify the characteristics of high performance teams that lead to the most effective and efficient delivery of care and patient and provider satisfaction. If you agree to participate in this study you will be asked to complete a number of confidential questionnaires that will assess your views on your teams functions and approaches to working. You may also be asked to join a focus group to further explore the tools used and your views on team function.

Benefits: You may or may not obtain any specific benefits from this study. Your involvement may help you reflect on characteristics that may improve team function or learn new approaches that may be helpful in your work.

Risks: The study tools may raise questions on the practices in your team and could potentially lead to conflict if you decide to question or change the way the team functions.

Voluntary Participation: Your participation in this study is completely voluntary. As well, you may choose to withdraw from the study at any time.

Confidentiality: All information collected for this study will be recorded on forms or computer files that are identified by a study ID and not by your name. A separate list connecting the Study ID with your name will be kept by our project coordinator in a locked file. You will not be identified in any reports or scientific papers published as a result of this study. Only group or summary data will be reported. All data in paper format will be kept in a locked filing cabinet in a secure office. All data in electronic format will be kept in password-protected files.

Any information recorded in focus groups will be deleted after transcripts are typed. No identifying information will be included in the transcripts.

If there is anything about the study you do not understand please ask the research assistant now before signing the consent.

If you have any further questions about this study you may contact the principal investigator, Dr. Dianne Delva at 613-549-4480 or the Head of the Department of Family Medicine, Dr. Walter Rosser at 613-549-4480.

Appendix 2 Team effectiveness

Your relationship to the team:

Please rate the team in relation to the issues detailed in the following questions. Please circle a number (between 1 and 5) which you feel best reflects your overall perception of the team. (5=very, 1=not at all)

* Please note, your responses will be kept confidential and are for research information purposes only

1. How effective are the team at achieving their objectives?

(not at all) 1 2 3 4 5 (very)

2. How effectively does the team operate 'as a team' ?

(not at all) 1 2 3 4 5 (very)

3. How effectively does the team co-operate with other teams?

(not at all) 1 2 3 4 5 (very)

4. How effectively does the team co-operate with the organisation?

(not at all) 1 2 3 4 5 (very)

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