It's About Time: Rapid Implementation of a Hub-and-Spoke Care Delivery Model for Tertiary-Integrated Complex Care Services in a Northern Ontario Community

Nathalie Major, Marie Rouleau, Chantal Krantz, Karen Morris, François Séguin, Megan Allard, Jia Lu Lilian Lin, Mary Ellen Salenieks, Roxana Sultan and W. Gary Smith

Abstract

Children with medical complexity (CMC) in rural and northern communities have more difficulty accessing subspecialty health providers than those in urban centres. This article describes an alignment cascade in which leaders engaged peers and staff to rapidly roll out the implementation of a sustainably designed complex care model, integrated in the Champlain Complex Care Program and delivered in Timmins, Ontario. The Provincial Council for Maternal and Child Health's Complex Care for Kids Ontario (CCKO) strategy supports the implementation and expansion of a hub-and-spoke model of interprofessional complex care for CMC and their families. A nurse practitioner is the primary point of contact for the family and oversees coordination and integration of care; regional CCKO programs are committed to building capacity to provide safe, high-quality care for CMC in communities closer to their homes.

Rural and northern communities in Canada are known to experience poorer health outcomes than their urban counterparts (Young et al. 2016). In particular, populations affected by complex chronic conditions encounter greater challenges in accessing necessary healthcare in rural areas and are less likely to receive evidence-based care in rural communities (Murphy et al. 2012). This article describes the rapid implementation of a hub-and-spoke model of care for children with medical complexity (CMC). The model allows the benefits of southern Ontario's tertiary care expertise and resources to be extended to the north, providing care closer to home, improving care for a vulnerable population and building capacity in the community. The Children's Hospital of Eastern Ontario (CHEO) and the Cochrane-Temiskaming Children's Treatment Centre (CT CTC) in Timmins, Ontario, along with other organizations, demonstrated leadership and readiness for change. The model and factors that led to its success are described.

The Population

CMC describes a group of children with chronic conditions who have elevated service needs, functional limitations and high healthcare use (Cohen et al. 2011). In total, 0.67% of Canadian children live with medical complexity and consume approximately one-third of child healthcare resources (Cohen et al. 2012). These children and youth are often survivors of extreme prematurity, and experience neuromuscular degenerative conditions, orphan syndromes and other conditions that do not meet the criteria for disease- or organ-specific comprehensive care programs. They require multiple providers and supports across the acute, primary, home, school and rehabilitation care sectors. The challenge of providing physical care, optimizing development and arranging and attending visits to multiple subspecialists can require that one or both parents

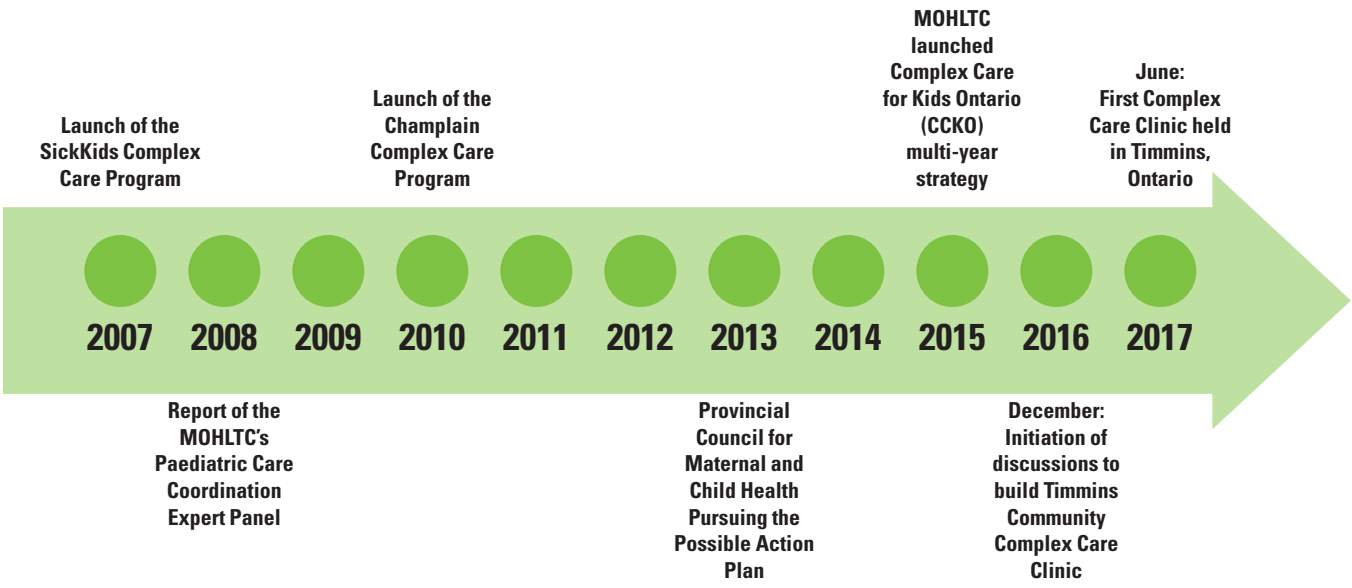
reduce or give up paid employment. Consequently, the families, caregivers and siblings of CMC can suffer profound stress, poor health and economic hardship (Ratliffe et al. 2002; Rosenbaum 2008; Sabbeth and Leventhal 1984; Wallander and Varni, 1998). The CMC population is growing and aging, and as it does, their families and our health system devote significant resources to their acute and ongoing care needs.

Evolution of the Complex Care for Kids Ontario Model

The design of Ontario's early pediatric complex care ambulatory clinics was informed by the chronic care model (CCM) and the medical home model. The CCM emphasizes the importance of coordination of care, linkages to community resources and building productive bidirectional relationships between patients and healthcare providers (Bodenheimer et al. 2002). The medical home model, originally conceptualized by the American Academy of Pediatrics (AAP), delivers continuous and comprehensive care to children and their families through individualized care planning and care coordination provided by a primary care practitioner in the patient's community (Stille and Antonelli 2004). Ontario's first two paediatric complex care ambulatory clinics were launched in 2007 and 2010, respectively, at the Hospital for Sick Children in Toronto (SickKids Complex Care Program) and the Champlain region in Eastern Ontario (Champlain Complex Care Program).[1]

Building upon several years of advocacy and recommendations of the 2008 *Report of the Paediatric Complex Care Coordination Expert Panel* (Rosenbaum 2008), in 2015, the Ontario Ministry of Health and Long-Term Care (MOHLTC) initiated the Complex Care for Kids Ontario (CCKO) multi-year strategy to advance province-wide coordination and integration of care for CMC with the most complex and ongoing care needs (Provincial Council for Maternal and Child Health 2013). The Provincial Council for Maternal and Child Health (PCMCH) provides provincial-level project management for CCKO implementation, whereas leadership and accountability for regional implementation sit with Ontario's four tertiary children's hospitals: The Children's Hospital of London Health Sciences Centre (CH of LHSC), McMaster Children's Hospital, SickKids and CHEO. The two northern LHINs, 13 and 14, access specialized care through southern Ontario pediatric tertiary centres. Figure 1 presents a timeline of the events leading up to the development of the community complex care ambulatory clinic in Timmins, Ontario.

FIGURE 1.
Timeline of events leading up to implementation of the Timmins Community Complex Care Clinic



CCKO Model

The CCKO hub-and-spoke care delivery model incorporates core elements from Ontario's early complex care ambulatory clinics and is designed to deliver care closer to home, build capacity among community providers and retain integration in the tertiary programs (Cohen et al. 2008). Through interprofessional partnerships among providers in the acute, primary, community and rehabilitation care settings and the child and family, this model aims to achieve integrated, seamless care that maximizes accessibility and minimizes duplication. The CCKO model includes a nurse practitioner (NP) within the interprofessional team at the tertiary complex care programs, who acts as the family's primary point of contact to coordinate services in the tertiary hospital and partner with local providers in the community complex care clinic. NPs have the authority to diagnose, order diagnostic testing and prescribe medications (College of Nurses of Ontario 2018). This expanded scope of practice meets the high level of care and support required by CMC. The NP is also responsible for keeping a comprehensive medical care plan in collaboration with subspecialists and community providers and through the coordination process capacity builds within the community team. A fulsome description of the objectives of the ambulatory complex care model is provided in the *Functions of a Complex Care Clinic and Program Standard* document (highlights outlined in Appendix A at https://www.longwoods.com/content/25624) (PCMCH 2017).[2]

The Opportunities

Timmins is a city in northeastern Ontario with a population of 41,788 (Statistics Canada 2017). As shown in Figure 2, the Timmins and District Hospital (TaDH) catchment encompasses the residents of the City of Timmins and Cochrane District, as well as the adjoining areas of the Temiskaming, Sudbury and Algoma districts (Timmins and District Hospital n.d.) and has a referral relationship with CHEO.

FIGURE 2.
Timmins and District Hospital catchment area

CMC at times need to be transported for urgent or scheduled care from Timmins to CHEO in Ottawa by ORNGE air transport, at significant transport costs. In addition, personal costs accrue to the family, in terms of lost wages, food and accommodation near the tertiary centre, as well as extraction from their home and their support network. In 2016, CCKO funding through PCMCH enabled the Champlain Complex Care Program to hire a full-time, bilingual NP to its tertiary interprofessional care team. The addition of the NP to the team created capacity to deliver services beyond Ottawa.

Meanwhile, the former program medical director of maternal child care of the Orillia Soldiers Memorial Hospital, Dr. W. Gary Smith – who had piloted one of the first community complex care clinics integrated in the SickKids Complex Care Program – had accepted an appointment as the chief of neonatal and paediatric medicine at the TaDH. As chief, Dr. Smith wanted the children/youth and families of Timmins and area to receive the care coordination and access to tertiary specialists that his patients in Orillia had received. He found a powerhouse ally in the executive director, Ms. Marie Rouleau, of the CT CTC. Ms. Rouleau, in turn, engaged "the northern team," which included rehabilitation therapists from the CT CTC, the LHIN care coordinator manager and the chief nursing officer of the TaDH.

The needs of the Timmins CMC and their families were CHEO's perfect opportunity to extend their reach. A community complex care clinic with tertiary integration is the model first developed by The Hospital for Sick Children's Complex Care Program and endorsed by the CCKO provincial leadership. Dr. Smith requested that CHEO work with the TaDH and CT CTC to develop and deliver complex care closer to home, and all parties agreed to proceed. Further details about the collaborative leadership essential to this success are provided in the "Critical Elements of Success" section of this article.

Why Is This Cascade of People and Conversations Worth Telling?

The current project in Timmins demonstrates that a robust model of care linking community and tertiary hospitals in southern Ontario can be replicated to serve a northern population. The implementation of the Timmins community complex care clinic was also notable for its speed and quality. Previous experience with implementing community complex care programs in southern Ontario has shown that an average of two years was required to build relationships, develop stakeholder buy-in and ensure organizational readiness for change (personal communications, January–December 2017, M.E. Salenieks, J. Orkin, J. Soscia, K. Langrish). The initial conversations between the TaDH chief of neonatal and pediatric medicine and the medical lead for the CHEO-based complex care program took place in late 2016. Three months into 2017, regular planning meetings were under way. A detailed description of the key activities, challenges and lessons learned is provided in Appendix B (https://www.longwoods.com/content/25624).

The first complex care clinic in Timmins was held in June 2017. The CHEO-based NP flew to Timmins, and with the Timmins community pediatrician, TaDH chief of neonatal and paediatric medicine, the LHIN care coordinator, CTC rehabilitation therapist and other community service providers, conducted full intake assessments with three families and began developing plans of care.[3] Care integration is enhanced by having both the North East LHIN and CT CTC care coordinators actively involved in the Timmins complex care clinic appointments. The mother of one of the first patients seen in Timmins was involved in the planning of this clinic and provided valuable advice that helped shape the format, processes and relationships for the clinic. She later reported having had a tremendously positive experience about receiving care closer to home as this meant one less trip to Ottawa. "This clinic creates an open conversation between CHEO and Timmins," said Megan Allard, Lydia's mother and a full-time caregiver. "Timmins is our home, but CHEO is our second home, and it's very important that everyone is informed and well-versed in Lydia's ever-changing condition. The clinic bridges the gaps and chances of missing something, or not being able to get a hold of somebody for answers."

Critical Elements of Success

Most of the clinicians and administrators involved in the development of the Timmins community complex care clinic were senior practitioners. They recognized the rewarding experience of strong synergy in collaboratively planning and implementing the Timmins clinic. In a scheduled debrief, stakeholders uniformly decided to share the story about the care delivery model and this high-quality, rapid implementation. It was agreed that each key stakeholder would write up an "experience statement" to understand the "whole" from multiple perspectives. Enablers and outcomes were identified from the stakeholder statements (Appendix C – https://www.longwoods.com/content/25624). In planning this article, members individually described their experience, and the critical elements of success were distilled from the statements.[4]

1. Enthusiasm about the common goals

It has been shown in prior research that implementation fidelity increases when the individuals responsible for implementation are enthusiastic about the intervention (Carroll et al. 2007). A high level of emotional investment in the common goals was reflected in many of the stakeholders' statements.

2. A team with a shared leadership dynamic

The stakeholders involved in project implementation demonstrated collaborative leadership. Collaborative leaders "have

to learn to share control, and to trust a partner to deliver" (Archer and Cameron 2009, xv). Stakeholders reported a sense of shared ownership and mutual contributions.

3. A pre-existing culture of collaboration and caring for their own

A culture of collaboration in Timmins was identified as an enabler for this work.

4. Relationships formed over shared goals

The experience of relationship building was an enjoyable by-product, and all stakeholders believe that this strengthened the collaboration process.

5. The connector: a project manager devoted to the work was essential

Hiring of a dedicated project manager was essential for project success.

Outcomes

1. Care closer to home

The greatest impact of establishing the Timmins community complex care clinic was that it enabled families of CMC to receive timely, appropriate and high-quality care closer to home. Megan Allard, the mother of a child with medical complexity who was involved in planning the Timmins clinic, reflected on how the Timmins complex care clinic benefited her daughter and family:

> The most impactful part of the clinic is that it allows us to raise our daughter here, where we grew up and have the support of our friends, our family, and our community. It also allows us to remain in our home and not have to relocate because there simply isn't enough resources to keep up with a child with complex medical needs here in the north. Having that liaison between our community team and a tertiary level children's hospital like CHEO is essential in helping kids like our child thrive in their home environment.

2. Win-win: benefits to the Timmins community, CHEO and PCMCH/CCKO were significant

The benefits of the Timmins clinic were not isolated to CMC and their families and accrued to all organizations involved in the project (e.g., CHEO, PCMCH/CCKO). For Chantal Krantz, the manager of the Champlain Complex Care Program at CHEO who was intimately involved with the building of the Timmins clinic, the benefits of the Timmins clinic were immediately apparent at her own organization:

> It was like watching the Timmins "just make it happen approach" be so contagious for CHEO specialists when approached by the NP to be involved in the satellite visits. I was so impressed to see CHEO specialists change their schedule to be on teleconference with the NP while she was in Timmins.

Mary Ellen Salenieks, the senior program manager at PCMCH at the time of the Timmins clinic implementation, recognized the uniqueness of this collaborative effort and its potential for bringing long-term benefits to a northern community:

> This was an important opportunity. CCKO had no formal footprint in the "north," the vast region served by LHINs 13 and 14, and the new chief had the medical and provincial leadership and northern credibility to bring the new service to the Timmins community.

Concluding Remarks

A tipping point for change can exist. Through a confluence of effective change leaders, embracing of opportunities, collaboration with and between community and tertiary service providers and engagement of patient partners, the development of the Timmins community complex care clinic serves as an exemplar of rapid service delivery improvement for children with medical complexity in rural and remote communities. Although the number of patients who will eventually be served in the Timmins complex care clinic is small compared to integrated community clinics in the Greater Toronto Area, the saved costs in air ambulance transport and other family expenses, as well as the improved patient and family experience, will provide a significant return on investment to the health system and relief of burden for the family, in a short period of time. Discussions continue with stakeholders from Timmins and other northern communities about the need to consider the remote locations and fewer local specialty services as an additional layer of complexity in accessing care. HQ

Notes

1. The Champlain Complex Care Program is a partnership between CHEO, Champlain Local Health Integration Network (LHIN), Ottawa Children's Treatment Centre, Roger Neilson House, Coordinated Access and Ottawa Rotary Home.
2. Key components of the CCKO model align closely with the commitment of the MOHLTC's Health Links strategy and the Ministry of Child and Youth Services' Special Needs Strategy to improve care coordination and quality of services for CMC and their families.
3. The process flow maps for the clinic are available by contacting Dr. N. Major at CHEO: nmajor@cheo.on.ca.
4. Statements that support the identified elements of success can be found in Appendix C at https://www.longwoods.com/content/25624.

References

Archer, D. and A. Cameron. 2009. *Collaborative Leadership: How to Succeed in an Interconnected World*. London, UK: Routledge.

Bodenheimer, T., E.H. Wagner and K. Grumbach. 2002. "Improving Primary Care for Patients with Chronic Illness." *JAMA* 288(14): 1775–79.

Carroll, C., M. Patterson, S. Wood, A. Booth, J. Rick and S. Balain. 2007. "A Conceptual Framework for Implementation Fidelity." *Implementation Science* 2: 40.

Cohen, E., J. Friedman, D.B. Nicholas, S. Adams and P. Rosenbaum. 2008. "A Home for Medically Complex Children: The Role of Hospital Programs." *Journal for Healthcare Quality* 30(3): 7–15.

Cohen, E., D.Z. Kuo, R. Agrawal, J.G. Berry, S.K. Bhagat, T.D. Simon et al. 2011. "Children with Medical Complexity: An Emerging Population for Clinical and Research Initiatives." *Pediatrics* 127(3): 529–38.

Cohen, E., J.G. Berry, X. Camacho, G. Anderson, W. Wodchis and A. Guttmann. 2012. "Patterns and Costs of Health Care Use of Children with Medical Complexity." *Pediatrics* 130(6): e1463–70.

College of Nurses of Ontario. 2018. *Practice Standard: Nurse Practitioner*. Retrieved July 31, 2018. <https://www.cno.org/globalassets/docs/prac/41038_strdrnec.pdf>.

Murphy, K.L., D. Kobayashi, S.L. Golden and S. Nageswaran. 2012. "Rural and Nonrural Differences in Providing Care for Children with Complex Chronic Conditions." *Clinical Pediatrics* 51(5): 498–503.

Provincial Council for Maternal and Child Health. 2013. *Pursuing the Possible: An Action Plan for Transforming the Experiences of Children and Youth Who Are Medically Fragile and/or Technology Dependent*. Retrieved July 31, 2018. <http://www.pcmch.on.ca/wp-content/uploads/2016/02/Pursuing-the-Possible_PCMCH-Action-Plan_-Final_Jan-2013.pdf>.

Provincial Council for Maternal and Child Health. 2017. *CCKO Functions of a Complex Care Clinic and Program Standard*. Retrieved July 31, 2018. <http://www.pcmch.on.ca/wp-content/uploads/2017/10/CCKO-Functions-of-a-Complex-Care-Clinic-and-Program-Standard-.pdf>.

Ratliffe, C.E., R.C. Harrigan, J. Haley, A. Tse and T. Olson. 2002. "Stress in Families with Medically Fragile Children." *Issues in Comprehensive Pediatric Nursing* 25(3): 167–88.

Rosenbaum, P. 2008. *Report of the Paediatric Complex Care Coordination Expert Panel*. Ontario Ministry of Health and Long-Term Care. Retrieved February 3, 2018. <www.sickkids.ca/pdfs/Paediatric-Medicine/31088-PaediatricComplex>.

Sabbeth, B.F. and J.M. Leventhal. 1984. "Marital Adjustment to Chronic Childhood Illness: A Critique of the Literature." *Pediatrics* 73(6): 762–68.

Statistics Canada. 2017. "2016 Community Profiles." Canada 2016 Census. Retrieved February 6, 2018. <http://www12.statcan.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E>.

Stille, C.J. and R.C. Antonelli. 2004. "Coordination of Care for Children with Special Health Care Needs." *Current Opinion in Pediatrics* 16(6): 700–705.

Timmins and District Hospital. n.d. "About TaDH." Retrieved February 8, 2018. <https://www.tadh.com/about-tadh>.

Wallander, J.L. and J.W. Varni. 1998. "Effects of Pediatric Chronic Physical Disorders on Child and Family Adjustment." *The Journal of Child Psychology and Psychiatry and Allied Disciplines* 39(1): 29–46.

Young, T.K., S. Chatwood and G.P. Marchildon. 2016. "Healthcare in Canada's North: Are We Getting Value for Money?" *Healthcare Policy* 12(1): 59–70.

About the Authors

Nathalie Major, MD, FRCPC, is a pediatrician and the medical director of the Complex Care Program at the Children's Hospital of Eastern Ontario and Ottawa Children's Treatment Centre. She works on national and provincial initiatives, advising on integrated care models. The focus of her research is on models of care coordination for children with complex chronic conditions.

Marie Rouleau is the executive director of the Cochrane-Temiskaming Children's Treatment Centre in Timmins, ON. She is from Smooth Rock Falls in northern Ontario and has worked for close to 30 years in various domains related to persons with special needs who live in northern Ontario.

Chantal Krantz, RN, MScN, BScN, is the manager of Connected Care for Development and Rehabilitation at the Children's Hospital of Eastern Ontario and Ottawa Children's Treatment Centre. She has a keen interest in integrated healthcare systems and care coordination to improve health outcomes for children, youth and their families.

Karen Morris, MSN, NP (PHC), is a complex care nurse practitioner at the Children's Hospital of Eastern Ontario and Ottawa Children's Treatment Centre. She is a member of a working group dedicated to bringing tertiary-level complex care to northern families and communities.

François Séguin, MHA, CHE, is the operational lead for the Project Management Office at Hawkesbury General Hospital. He was previously the project coordinator for the Timmins Community Complex Care Clinic.

Megan Allard is the mother of a medically fragile child assisting the Champlain Complex Care Program with a parent's perspective.

Jia Lu Lilian Lin, MPH, is a doctoral student in health services research at the Institute of Health Policy, Management and Evaluation, University of Toronto, and a research analyst at the Provincial Council for Maternal and Child Health. She is broadly interested in health policy and the social and ethical dimensions of healthcare.

Mary Ellen Salenieks, RN, senior program manager for the Provincial Council for Maternal and Child Health has focused on project work within and across tertiary and community healthcare organizations.

Roxana Sultan, MHSc, MSc, is the executive director of the Provincial Council for Maternal and Child Health. She has a keen interest in demonstrating tangible, patient-centred outcomes associated with the implementation of quality improvement initiatives in maternal, neonatal and pediatric healthcare services.

W. Gary Smith, MD, FRCP, FAAP, MHSc, CHE, CCPE, is an associate professor at the Department of Paediatrics, University of Toronto and the chief of Neonatal and Paediatric Medicine at Timmins and District Hospital.