

Specialized Multidisciplinary Community-Based Care for Chronic Wounds: A Field Evaluation

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Executive Summary

Background

Every year, 22,000 long-stay (> 60 days) clients of the 14 Community Care Access Centres (CCACs) in Ontario receive care for chronic wounds. Patients with chronic wounds, who often have multiple co-morbid conditions, are increasing in number as our populations ages.

In 2009, the total wound care cost to CCACs was \$108 million, second only to the total cost of care for medically fragile children. Among many costly chronic illnesses and health problems within home care, wound care was identified as the most pressing priority for quality improvement (Integrated Client Care Project, 2009)

The burden of wound care is not unique to Ontario. In a retrospective chart review of patients with severe (stage IV) pressure ulcer (PrU) admitted to a US tertiary care hospital, the average cost for PrUs ranged from approximately \$124,000 (community acquired) to \$130,000 (hospital acquired) (Brem, et al., 2000). Chronic wounds in the United Kingdom have been estimated to consume 3% of total estimated public health expenditure (£2.3-3.1 billion for 2005/6) (Posnett & Franks, 2007). The total impact of chronic wounds to the Canadian health care system has not been measured. In Ontario, the average annual cost of community care for a diabetic foot ulcer and venous leg ulcer has been estimated at \$4,868 and \$5,554 respectively (Shannon, 2007). Assuming a prevalence of 90,000 diabetic foot ulcers and 15,000 venous leg ulcers in Ontario, the total annual cost of these chronic wounds are \$438 million and \$83 million respectively (Shannon, 2007).

In light of the increasing prevalence of chronic wounds, the inherent complexity in their management and the need to provide comprehensive care to these patients in the community, the concept of multidisciplinary,

community-based care (intermediate care) appears to be relevant.

In 2008, the Medical Advisory Secretariat, on behalf of the Ontario Health Technology Advisory Committee, systematically reviewed the effectiveness of community-based specialized multidisciplinary wound care teams compared to non-team care for the management of chronic wounds.

Because the evidence was suggestive but not definitive, the Ontario Health Technology Advisory Committee recommended a field evaluation to evaluate the effectiveness and cost-effectiveness of specialized multidisciplinary wound care teams for community based patients with chronic wounds in Ontario (OHTAC, 2009), directly aligned with the Intermediate Care strategy for chronic disease management.

Research Objectives

In 2010, the Ontario Health Technology Advisory Committee (OHTAC) and the Medical Advisory Secretariat (MAS) commissioned the Toronto Health Economics and Technology Assessment (THETA) Collaborative to conduct a field evaluation to address the following policy questions:

What is the effectiveness and cost-effectiveness of specialized multidisciplinary wound care teams for community based patients with chronic wounds in Ontario, in contrast to standard care?

The field evaluation was conducted in phases with specific objectives described below.
Phase 1: Identify specialized multidisciplinary wound care teams in Ontario.

Phase 2: Describe the characteristics and service models of the identified specialized multidisciplinary wound care teams in Ontario.

Phase 3: Evaluate the clinical effectiveness and cost-effectiveness of specialized multidisciplinary wound care teams in Ontario.

Phase 3 of the field evaluation is an on-going pragmatic randomized controlled trial and is the subject of a separate report. The current report describes the methods and results of Phases 1 and 2.

Methods

Phase 1: Identify specialized multidisciplinary wound care teams in Ontario.

We conducted a survey to systematically identify all multidisciplinary wound teams in Ontario. First, we conducted a phone survey of all CCACs (n=14), acute care hospitals (n=254), Family Health Teams (FHTs, n=157) and community health centres (CHCs, n=53) across the province. Second, we posted notices in online wound care forums.

To ensure saturation of the surveyed population, we also used a “snowball sampling” approach.

Phase 2: Describe current service models of specialized multidisciplinary wound care teams in Ontario.

We developed and administered a survey to capture characteristics and service models of identified teams in consultation with content experts representing various disciplines across the province.

Results

Phase 1: Identify specialized multidisciplinary wound care teams in Ontario

We identified 49 wound care teams across the 14 CCACs; on average, there are between 3-4 teams per CCAC. CCACs with relatively large numbers of wound teams include Toronto Central (n=10), Hamilton Niagara Haldimand Brant (n=6) and North East (5). CCACs with only one team are Waterloo Wellington, North

Simcoe Muskoka, and South East. The number of elderly (i.e. over age 65) Ontario residents served by individual teams across the province ranges from approximately 8,000 elders/team to 76,000 elders/team, with an average of approximately 41,000 elders/ team.

Phase 2: Describe current service models of specialized multidisciplinary wound care teams in Ontario.

A survey was administered to leaders of the 49 teams identified in Phase 1 (44 responded, a 90% response rate) over a 6 month period (Sept. 2010-Feb. 2011).

Team characteristics

The majority of wound care teams in Ontario are well established: 29 (66%) teams have been in operation for at least 5 years, while only 2 (5%) teams were formed in the past year.

The majority of teams are led by a physician (56%) or a nurse (31%). Rarely do teams include a social worker (25%), dietician, or nutritionist (23%).

Twenty seven (61%) teams are located within out-patient departments and funded by hospitals. The remaining teams are in free standing clinics (including 2 mobile clinics), family health teams, and a long-term care home.

Each year, teams see an average of 579 unique patients (SD-609), and conduct approximately 2000 patient visits (SD-2679), including 282 new patients per year (SD-224).

Patient population

Distributions of patients by wound aetiology varies substantially across teams. On average, chronic wounds account for 75% of the services the teams provide. Patients are referred for diabetic ulcers (average aetiology distribution: 45%), PrUs (15%), venous leg ulcers (13%), arterial leg ulcers (7%), and surgical wounds (6%).

On average, teams follow patients for approximately 7 months (SD: 6 months). The average dropout rate for follow-up visits is approximately 7%. The most common reasons

stated for dropout are inability to access transportation, transportation costs and non-adherence.

For patients requiring priority treatment interventions (e.g. off-loading for diabetes related foot ulcers, compression stockings for venous leg ulcers), clients typically pay out of pocket (23%) or through private insurance (22%). Other key funding sources include the Ontario Disability Support Program and the Access Assistive Devices Program.

Diagnostic and specialized treatment

Most teams reported having access to best practice guidelines for clinician reference. Teams use a variety of tools for on-site diagnosis, including microbiological tests (89%), ultrasound (64%), wound biopsy (64%), X-ray (64%), bone culture (57%) and CT scan (50%). Besides debridement (100%), teams also use on-site specialized treatments; the most common treatments include off-loading devices (77%), orthotic casting (59%), negative pressure therapy (55%), and ultrasound treatment (27%). Five teams are equipped with on-site hyperbaric oxygen therapy (11%). Twenty (45%) teams use telemedicine, mainly video link for wound treatment, patient management and clinician education.

Referral pathways

There are multiple sources of referral to teams; the most common sources include MDs (34%), community nurses (16%), and CCACs (16%). The most common services accessed by teams are microbiology (depending on accessibility, 5%-68% of the teams use on-site, local or distant off-site referrals), radiology (5%-64%), physiotherapy (5%-61%), dermatology (20%-59%), orthopaedic support (7%-57%), occupational therapy (9%-55%), surgery (7%-50%), nutritional assessment (2%-45%), wound management specialties (18%-45%), and infectious diseases (36%-43%). The average waiting time for patients to be seen by teams is 23 days (SD: 34 days).

Education for patients and family / informal care givers

Forty three teams (98%) provide education or support for patients to improve adherence to treatment plan; 41 teams (93%) provided structured education and 27 teams (61%) use informal education. All teams provide education or support for family and informal caregivers, including structured and informal education.

Thirty seven teams (84%) provide follow-up services for patients, including follow-up telephone calls placed by the team to patients (45%), telephone support lines for patients to call team members (23%), and self-monitoring with phone follow-up (27%). Similar services are provided for family and informal care givers. All teams indicated that their patients can contact team members directly if they have concerns. Patients can reach team members by direct phone call (89%), pager (14%) or online (18%).

Peer support

Four teams (9%) provide peer support programs for patients and their family / informal care givers, while 40 teams do not provide any peer support. Thirty one of forty teams (70%) felt that a peer support program would be helpful.

Team effectiveness

In responding to the open ended question regarding which aspects of care accounted for their team's effectiveness, the teams identified some common factors including: (i) supportive team dynamics and mutual respect of dedicated team members, (ii) advanced wound knowledge with an emphasis on clinical education for team members, and (iii) the multi-disciplinary aspect of treatment. Regarding team challenges, common opinions included: (i) lack of resources (time, space and human resources), (ii) onsite diagnostics, (iii) onsite specialized treatments and access to clinician education, and (iv) absence of dedicated team funding.

Discussion

There is wide variation in the number, characteristics, and service models of specialized multidisciplinary wound care teams across the province. Some regions of the

province may be underserved with multidisciplinary teams. Some existing teams cannot provide key services for patients with chronic wounds.

Due to the increasing prevalence of chronic wounds and the limited human and financial resources available to meet these growing needs, the role of telemedicine to extend the reach of specialty teams may require further exploration.

The complexity of chronic wounds, and the inherent importance of patient adherence in their treatment support increased access to allied health professionals (e.g. Social Workers, Dieticians) and peer support for patients and families affected by chronic wounds.

Care coordination is a key problem in supporting patients with chronic wounds. In addition to multidisciplinary teams, care is also often provided by family physicians, and visiting nursing and allied health services provided through CCAC's. Mechanisms to improve coordination of care should be explored, including the potential use of electronic information and referral systems.

Background

Chronic Wounds

Chronic wounds are defined as wounds that have failed to proceed through an orderly and timely process that results in a return to anatomical and functional integrity (Lazarus et al. 1994). Wounds may become chronic if the diagnosis is incorrect, or the wound is not properly managed (CAWC [<http://cawc.net/index.php/public/facts-stats-and-tools/basics/>]; Kersetin, 1997). Chronic wounds often occur in the presence of peripheral neuropathy, chronic venous insufficiency, atherosclerosis, or prolonged pressure in a certain area of the body (RNAO, 2005; NPUAP, 2001). A chronic wound can affect any region of the body, but the majority of wounds are found in the lower extremities.

Each year, approximately 22,000 long-stay (> 60 days) clients of the 14 Community Care Access Centres (CCACs) in Ontario receive services for chronic wounds, including pressure ulcers (PrUs) (1.8% prevalence), venous or arterial ulcers (2.2%), and diabetic foot ulcers [Personal communication with Dr. Jeff Poss (<http://www.inforehab.uwaterloo.ca/index.cfm?section=2&page=3&subpage=4&peopleID=5>)]. Among these long-stay clients, 25% have diabetes, 52% have arthritis and 24% have at least one neurological disorder [Personal communication with Dr. Jeff Poss. Among patients receiving wound care in the community, the mean treatment duration was 27 months, with approximately 60% of the patients with wounds showing no signs of improvement or getting worse, and 54% of the patients with a wound-related complication in the previous three months (Rodrigues & Mégie, 2006).

Pressure Ulcers

A PrU is defined as an area of localized damage to the skin and underlying tissue due to pressure, shear, or friction (Fleurence, 2005). They usually occur over bony prominences and are common in the elderly, the very ill, patients who are neurologically compromised, and in individuals with conditions that are associated

with immobility. PrUs are costly to treat and may have a significant impact on the quality of life for affected individuals (Keast et al. 2007).

It is estimated that 1.3 million to 3 million adults in the US have a PrU (Bergstrom et al. 1992; Lyder et al. 1998). In Canada, the prevalence of PrUs is estimated to be 30% in long-term care (LTC) settings, 25% in acute care settings, and 15% in community care settings (Woodbury & Houghton, 2004). The overall prevalence for PrUs across all health care settings is estimated to be 26% (Woodbury & Houghton, 2004). A Medline database search depicting ranges of PrU incidence from 1990 to 2000 by clinical setting and population showed that the incidence of PrUs varies, ranging from 2.2% to 23.9% in LTC settings, 0.4% to 38.0% in hospital settings, and 0% to 17% in community care settings (Cuddigan et al. 2001). Although treatable if found early, PrUs can become life-threatening, and in rare instances, lead to fatal infections. If left untreated, PrUs are associated with adverse health outcomes and high treatment costs (Reddy et al. 2006), which could delay functional recovery, impair quality of life, and cause complications that require hospitalization with prolonged length of stay, as well as a two-fold increased risk of death (Bale et al. 2007; Landi et al. 2007; Roghmann et al. 2001). The cost of healing a PrU is high because it often involves complex treatments and potentially, hospitalization. Once a PrU reaches stage III or IV, it may take as long as six months to heal. Some PrUs may not be healable due to existing co-morbidities (Bale et al. 2007; Roghmann et al. 2001). An average hospitalization cost for treatment of PrUs is estimated at \$38,000 (Ducker, 2002). In the US, costs to heal each ulcer are estimated at \$500 to \$40,000 (Bergstrom et al. 1992; Lyder et al. 1998). The estimated annual cost of caring for PrU's in the US is \$11 billion per year (Kuhn & Coulter, 1992). In a Canadian study, Allen & Houghton (2004) estimated that the total cost for 3-month care of a person with a stage III PrU in the community was \$27,500 per patient. Overall

in Canada PrUs cost approximately \$2.1 billion annually (Woodbury & Houghton, 2004). In the UK in 1992, PrUs cost the average health district approximately £300,000 to £750,000 [\$420,000 to \$1,050,000 (CAD)] per year (Clark & Cullum, 1992).

Leg and Foot Ulcers

Venous leg ulcers account for the majority of leg ulcers (RNAO; Kunimoto et al. 2001; Berard et al. 2002; Burrows et al. 2007; Nicolaidis et al. 2000). Diabetic foot ulcers and ischemic ulcers contribute to a significant proportion of the remainder of chronic wounds (Eaglstein & Falanga, 1997; Fonder et al. 2008; Jones et al. 2007; Simon et al. 2004). An Ontario study identified 263 people with venous leg ulcers for a rate of 2.0 per 1,000 people >25 years of age (Lorimer et al. 2003). The total expected annual cost per client was \$4,868 for diabetic foot ulcers and \$5,554 for venous leg ulcers treated under standard community care (Shannon, 2007). In Ontario the annual cost of lower extremity ulcer care in the community is estimated to be \$511 million based on a prevalence of 90,000 diabetic foot ulcer clients and 15,000 venous leg ulcers clients (Shannon, 2007).

Treatment of Chronic Wounds

Treatment for chronic wounds is complex, requiring consideration of system, provider, patient and wound characteristics (Bergstrom et al. 2005). Standard care for chronic wounds includes: cleaning with tap water or saline, debridement, application of wound dressings (hydrogel, hydrocolloid, alginate, foam, hydrofiber, transparent film, composite, collagen), treatment of underlying conditions, mobilization, pressure offloading, antibiotics, compression, nutritional support, moisture management, turning and repositioning schedules, and education. Technologies such as pressure relieving beds or cushions, hyperbaric oxygen therapy, negative pressure devices, skin substitutes, skin flaps/grafting, and compression bandages may be employed (RNAO). Selection of the most appropriate therapy is based on the individual patient's

clinical condition, wound etiology, social factors, and available resources. Because treatment is complex, a multidisciplinary team approach involving a close collaboration between physicians, nurses, pharmacists, podiatrists, occupational therapists, nutritionists, and physiotherapists is optimal. (Doan-Johnson, 1998; Frykberg, 1998; Granick & Ladin, 1998; Gray, 1996).

Multidisciplinary Teams

The idea of a multidisciplinary team approach has increasingly been accepted as the best way to deliver wound care. Gottrup et al. (2003) suggested that multidisciplinary specialized wound healing organizations integrated within a national health care system would be the ideal way to organize wound healing to best benefit patients and society. Multidisciplinary approaches to wound care in the primary health care sector, as well as in hospitals have been suggested to reduce the number of home visits and the range of treatment products used (Davey et al. 1994; Eagle, 1994). In a study by Gibbons et al. (1993), an 84% reduction in the incidence of major lower extremity amputations was achieved after utilizing a multidisciplinary team approach. A similar result was seen in a study by Frykberg (1998). Granick & Ladin (1998) suggested that a multidisciplinary team approach decreased the incidence of PrUs from 23% to 8% after three years in one institution and decreased the prevalence of hospital-related PrUs by 15% in one year in another institution.

In 1994, the treatment of PrUs by a multidisciplinary approach was recommended by the American Diabetes Association's Council on Foot Care (ADA, 1999; Doan-Johnson, 1998). Over the past 10-15 years, different types of multidisciplinary models for the treatment of complex wounds have been established (Apelqvist et al. 1994; Boulton et al. 1999; Frantz et al. 1995; Edmonds et al. 1986; Gottrup et al. 2001; Gottrup, 2000; Gottrup, 1998; Jaramillo et al. 1997). In the US, commercial wound centres and wound care clinics in university programs have been organized (Keyser, 1993; Steed et al. 1993; Ennis & Meneses, 1998; Rees & Hirshberg, 1999; Eagle, 1994; Davey et al. 1994; Knighton et al. 1990).

The Ontario Perspective

In Ontario, the majority of wound care services to individuals in the community are coordinated by Community Care Access Centre (CCAC) case managers. The current primary wound care model is characterized by: i) referrals by CCAC case managers to nursing agencies; ii) wound care provided by registered nurse (RNs) and registered practical nurses (RPNs) from the agencies; iii) a blended reimbursement rate paid to nursing agencies by CCACs for RN and RPN visits. Agencies receive a fixed reimbursement, regardless of whether an RN or RPN conducts an in-home visit; iv. generalist case managers are responsible for coordinating care for clients with wounds; v. wound care is based on individual physician's orders, usually faxed; vi. specialty wound consultation is arranged by nurses through family physicians; and vii. follow-up is variable (Harrison et al. 2005). During consultation with ten CCACs, common problems identified with this service delivery model included: i. inconsistent application of best practice guidelines; ii. lack of standardized documentation and wound outcome measures; and iii. poor co-ordination of care.

In 2008, the Medical Advisory Secretariat, on behalf of the Ontario Health Technology Advisory Committee, systematically reviewed the effectiveness and cost-effectiveness of a community-based multidisciplinary wound care team compared to non-team care for the management of chronic wounds. The MAS concluded that the identified evidence was limited. It suggested that a multidisciplinary wound care team increased the rate of wound healing, reduced wound-associated pain and decreased nursing visit frequency. However, the quality of evidence was assessed to be low, meaning that further research could have an important impact on these findings (MAS, 2009).

Since the evidence was suggestive but not definitive, the Ontario Health Technology Advisory Committee (OHTAC) concluded that existing models of intermediate care in Ontario for chronic wounds should be evaluated and a

field evaluation be undertaken to determine which models: 1) optimize patient outcomes and community-based care through interactions with primary and hospital care; 2) result in the appropriate referrals from primary and hospital care to maximize primary care involvement and skill set development; 3) are most feasible with regards to cost & appropriate use of healthcare providers; 4) are cost-effective; and 5) are likely to reduce the cost of service delivery (OHTAC, 2009).

Purpose

In 2010, the Ontario Health Technology Advisory Committee and Medical Advisory Secretariat commissioned the Toronto Health Economics and Technology Assessment (THETA) Collaborative to conduct a field evaluation to address the following policy questions:

What is the 1) clinical effectiveness and 2) cost-effectiveness of specialized multidisciplinary wound care teams for community based patients with chronic wounds in Ontario, in contrast to standard care?

The field evaluation was conducted in three phases with the following specific objectives:

Phase 1: Identify specialized multidisciplinary wound care teams in Ontario.

Phase 2: Describe characteristics and service models of specialized multi-disciplinary wound care teams in Ontario.

Phase 3: Evaluate the i) clinical effectiveness and ii) cost-effectiveness of specialized multidisciplinary wound care teams.

This report discusses phases I and II only.

Phase I - Identify all specialized multi-disciplinary wound care teams (MDWCTs) serving community-based patients with chronic wounds in Ontario



Phase I Methods

Multidisciplinary teams (MDWCTs) can be defined in several ways. We consulted with our expert panel consisting of clinicians and researchers with expertise in the field of wound care in order to obtain a working definition. First, we defined “discipline” as being congruent with conventionally viewed professional categories such as nursing, medicine, and physiotherapy. For example, enterostomal therapists and non-specialist nurses were regarded as belonging to “nursing” and not considered to be separate disciplines. Disciplines may work within the same location or may treat patients separately as long as responsibility was shared over the treatment of the wound. Thus, a referral system may count as a team. Initially we had conceptualized specialized multi-disciplinary wound care teams serving community based patients as being located in out-patient clinics, the reason behind the phrasing of the question posed to CCACs (see Appendix C). However it became obvious after the first few contacts with CCACs that the definition needed to be broadened to the concept of ‘team’ vs. ‘clinic’ since some teams identified by CCACs were not operating within clinics.

After considering these factors and reviewing the literature, for the purposes of this study, an operational community- based specialized multi-disciplinary wound care team was defined as follows:

A team having a minimum of 2 members with advanced training and/or > 5 yrs. of experience in wound care, representing a minimum of 2 different clinical disciplines (e.g., a dietician, a physiotherapist, an occupational therapist, a chiropractist, an orthotist, a physician, a nurse), who share responsibility for the community based patient with a chronic wound.

Teams meeting the above definition were deemed eligible to participate in the study.

We used three methods to identify eligible MDWCTs in Ontario.

First, we utilized contact lists of all Community Care Access Centers (CCACs), hospitals, community health centers (CHC), and Family Health teams (FHT), across the province. All sites were systematically contacted in order to identify any teams meeting the above definition (hereafter referred to as the First Sampling approach).

Second, notices were posted in online wound care forums asking teams to identify themselves (hereafter referred to as the Second Sampling approach).

Third, for all contacts made in the first and second sampling approach we also used a “snowball sampling” approach often used in qualitative or mixed methods research studies, typically when evaluating members of a population that are difficult to identify, or ‘hidden’ (Gholizadeh et al. 2009; Gustafsson et al. 2010; Rankin & Bhopal, 2001; Salganik, 2006). For our purposes, upon confirming the presence of a team (from the first and second sampling approaches) we asked whether they were aware of any other teams. We then noted all new teams identified and attempted to contact them in the same manner as above (hereafter referred to as the Third Sampling approach).

First Sampling Approach

CCACs

In total, there are 14 CCACs in communities across Ontario that are funded by Local Health Integration Networks through the Ministry of Health and Long-Term Care. The CCACs coordinate home care, admission to long-term care facilities, and discharge from hospitals onto CCAC community service. Each CCAC is staffed by administrators and clinicians who assess patients’ needs in the community and determine requirements for care, developing a customized care plan in collaboration with the patient/family. Upon determining eligibility for service, the CCAC arranges in-home visits from health-care professionals: nurses,

physiotherapists, social workers, registered dietitians, occupational therapists, speech therapist and personal support workers to provide a range of care and supportive services to help support clients within the home (1)

CCACs were our first point of contact ('seeds'). All CCACs (n=14) were contacted through their respective general switchboards and contact information was requested for the wound care lead for each CCAC.

These initial seeds were interviewed and formed stage 0 of the sampling process. When contacting Ontario CCACs, an initial email (Appendix C) was sent to CCAC wound care contacts asking for a list of any known wound care clinics in their catchment area. If there was no reply within 5-6 days, a follow-up phone call was made following a structured script. (Appendix D). CCACs that did not respond to voicemail within 5 or 6 days received a second phone call (appendix E). A final follow-up email (Appendix F) was sent 5-6 days after the second phone if no response had been received at the time. Follow up phone calls were conducted with identified wound care contacts (Appendix G). Upon review of the data collected from the CCACs it became apparent that all hospitals, CHCs and Family Health Teams (FHT) had to be contacted. The below systematic calls were a product of the feedback obtained from the CCAC list.

Hospitals

In order to identify all health care sites in Ontario defined as hospitals we consulted two lists. We imported the complete list of general hospitals from the MOH-LTC website http://www.health.gov.on.ca/english/public/contact/hosp/hosploc_mn.html Sites imported from the MOH-LTC website were classified as General Hospital locations. The total number of general hospital sites identified was 171. This information was cross referenced with the list of health care corporations and sites listed on the OHA website <http://www.oha.com/AboutUs/HospitalLocator/Pages/HospitalSummary.aspx?Mode=1> The OHA website provides a listing of all healthcare corporations in Ontario as well as

individual sites pertaining to each healthcare corporation. The OHA website listed a total of 152 healthcare corporations and 254 individual sites.

An amalgamated list from both sites was created to capture all possible hospital sites in Ontario. The list of information imported into one master list included: Hospital Corporation name, all sites associated with said healthcare corporation, site name and site phone number. All Healthcare corporations were sorted by LHIN. Each site sorted within each LHIN was contacted in alphabetical order and asked about the presence of wound care teams within that institution (script in Appendix A).

Community Health Centers

Community Health Centers (CHCs; n = 53) were identified utilizing the list provided on http://www.health.gov.on.ca/english/public/contact/chc/chcloc_dt.html#Forest. The list was imported into one spreadsheet and included CHC name and phone number. Each CHC identified within each LHIN was contacted in alphabetical order using a phone script (Appendix A).

Family Health Teams

FHT (n = 157) were identified utilizing the list provided on http://www.health.gov.on.ca/transformation/fht/fht_progress.html. The list was imported into one spreadsheet and included FHT name and site phone number. Each FHT identified within each LHIN was contacted in alphabetical order using a phone script (Appendix B).

Second Sampling Approach

In addition, a notice about the study was posted on the front page of the Canadian Association for Enterostomal Therapy (CAET), Canadian Association of Wound Care (CAWC) web sites and the Registered Nurses' Association of Ontario's (RNAO) "In the Loop" online newsletter under the latest news section in Nov 2010 (Appendix H) requesting members to contact the research co-ordinator if they knew of MDWCTs in Ontario. The study co-ordinator

contacted all respondents to confirm team eligibility and obtain contact details for the team lead.

Third Sampling Approach

The study co-ordinator asked all respondents to identify additional MDWCTs they were aware of.

Phase I Results

First Sampling Approach

Community Care Access Centers

A total of 15 potential teams were identified in Ontario across the 14 CCACs. A total of 7 of the 15 potential teams were confirmed. The data obtained from the CCAC revealed the need to systematically contact all hospitals and FHTs.

Hospitals

A total of 254 hospital sites were identified in Ontario. Among these sites, 222 were identified as not having a wound care team serving community based patients. A total of 32 sites were identified as having wound care teams serving community based patients.

Family Health Teams (FHT)

Family health teams are health care organizations that include a team of family physicians, nurse practitioners, registered nurses, social workers, dieticians, and other professionals who work together to provide health care for their community (3). A total of 157 family health teams were identified in Ontario via the online list mentioned above, 154 of which were not eligible due to lack of existence of a wound care team. Three FHTs were eligible and uniquely identified through the systematic calls to FHTs.

Community Health Centers

Community health centers are non-profit organizations that provide primary health and health promotion programs for individuals, families and communities. A total of 53 Community Health Centers were identified in Ontario, 52 of which did not have a wound care team. In one circumstance a CHC did provide

contact information for a clinic to which wound patients were referred. The team working in the clinic met the eligibility criteria Contact details of the team lead were obtained. This team was solely identified through the systematic calls to CHCs.

Second Sampling Approach

Newsletters

News bulletins were submitted to 3 organizations related to wound care, the Canadian Association for Enterostomal Therapy (CAET), Canadian Association of Wound Care (CAWC) web site and the Registered Nurses' Association of Ontario's (RNAO) "In the Loop" online newsletter under the latest news section in Nov 2010. A total of 4 sites identified themselves in response to the newsletters. In 2 instances the sites were not eligible because they 1) had less than two different disciplines represented on the team or 2) were not located within the community. Two teams responded that had already been identified via the first sampling approach. These teams were defined as duplicates.

Third Sampling Approach

Snowball Sampling

As part of our purposive sampling strategy, all respondents were asked if they were aware of any other teams. A total of 6 novel MDWCTs were identified via snowball sampling. Five teams were identified by one of the hospital contacts and the other team was identified by one of the CHCs.

Table 1: Multidisciplinary Wound Care Teams Identified Through Three Sampling Methods

Sampling Approach	Source	Sites	Total teams identified	Duplicate teams	Unique teams
1	CCAC (community Care Access Centers)	14	7	0	7
1	Hospital	254	32	0	32
1	FHT (Family Health Team)	157	3	0	3
1	CHC (community Health Centers)	53	1	0	1
2	Newsletters: (RNAO, CAET, CAWC)	4	2	2	0
3	Snowball sampling	521	6	7	6
Total		521	51	9	49

Sampling Approach: 1 = Calls from list; 2 = Newsletters; 3 = Snowball sampling

Source: through what list/sampling method the teams were found

Site: Total sites from each source

Total teams: refers to the total number of teams identified from each source

Duplicate teams: refers to teams already identified within other lists

Unique teams: refers to total number of teams not identified in any other lists

Regional Distribution of Wound Clinics

We identified MDWCTs in every LHIN (Fig. 1). The teams were concentrated in the south and central regions of the province, in keeping with the high population density in these areas. Toronto Central and HNHB had the most teams. Two LHINs (North Simcoe Muskoka and Waterloo Wellington) had only one team. A

high ratio of teams to residents were identified in the northern LHIN's.

Fig. 1 LHIN map depicting all teams identified. Bolded in red are the number of teams within the LHIN that agreed to complete the survey. In brackets are the numbers of refusals/non-responding teams. Non-responders have been defined as those sites/contact which were contacted a minimum of 3 times and either refused to participate in the survey or did not respond.

Figure 1: Regional Distribution of Wound Clinics

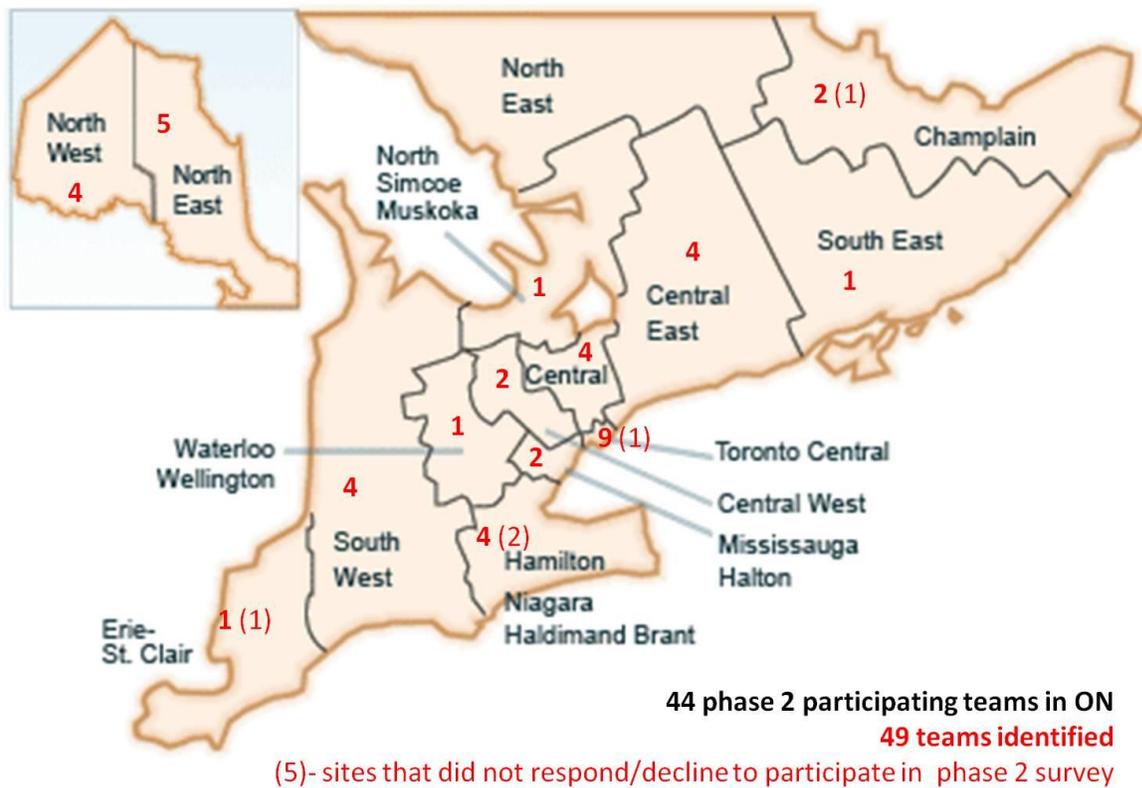


Table 2: Distribution of Teams and LHIN Population Profile. From the 2006 semi-custom profile for Canada, provinces, territories, health regions (December 2007) and peer groups (March 2009) 2006 census 20% sample data.

LHIN	# wound teams ¹	Total Pop. # ²	age 65yrs and over ³	>65 population per wound care team ⁴
Toronto Central	10	1,075,090	131,835	13,183
HNHB	6	1,298,270	192,385	32,064
North East	5	545,045	84,855	16,971
North West	4	231,930	31,380	7,845
South West	4	890,060	125,825	31,456
Central	4	1,522,760	183,145	45,786
Central East	4	1,419,750	184,550	46,137
Champlain	3	1,131,355	137,615	45,871
Central West	2	735,195	65,930	32,965
Erie St. Clair	2	623,280	84,995	42,497
Mississauga Halton	2	1,002,305	103,395	51,697
North Simcoe Muskoka	1	416,990	59,855	59,855
South East	1	457,205	74,710	74,710
Waterloo Wellington	1	679,670	76,000	76,000
Total	49	12,028,905	1,536,475	41,217

¹ # of wound teams- Total number of wound teams per LHIN identified in phase 1.

² Total population per LHIN (by sex and age group-20% sample data)

³ Total number of persons aged 65yrs and over per LHIN

⁴ population over 65years allocated to wound care teams per LHIN

As we see from the table figures the population over the age of 65 per team identified in phase 2 amongst the LHINS varies substantially, from about 8000 per team to >70,000. For example, the North West LHIN has 7,845 residents over 65yrs/ team while the Waterloo Wellington LHIN, has 76,000 residents over 65yrs/ team.

Phase II - Describe the characteristics and service models of specialized multi-disciplinary wound care teams



Phase II Methods

Data Collection

The data were collected via telephone administration of a survey conducted by the study co-ordinator with the team lead (or their designate) identified in Phase 1 (See Appendix 1). The survey was developed and piloted in consultation with content experts representing various disciplines across the province using an iterative process until consensus on data collection variables was attained. The final survey was e-mailed to leads of identified teams, asking them to familiarize themselves with the survey content prior to the telephone call. The phone call was followed by email to verify the information documented was correct. In addition, participants were invited to attend a meeting of all participants to review the compiled survey results.

Phase II Results

The survey was administered over a six month period (Sept. 2010-Feb. 2011) to leads (or their designates) of 44 of the 49 teams (90%) identified in Phase 1. Five teams (10%) declined participation. The reasons for not participating were absence of a team lead or designate, failure to respond after three attempts to contact, and team member illness.

The survey had 7 sections:

1. Characteristics of teams;
2. Team capacity;

3. Population served (OUT PATIENTS ONLY);
4. General service models;
5. Referral pathways;
6. Education for patients and family/informal care givers;
7. Peer support.

Results are reported by section, with summary points provided for each section.

Characteristics of Teams

Table 1.1: Characteristics of Teams

Years in Operation	COUNT	%
<1yrs	2	5
1-5yrs	13	30
5-10yrs	6	14
>10yrs	23	52
Team Location		
Hospital	27	61
Free standing clinic	9	20
Other (e.g. LTC, non affiliated hospital clinic)	8	18
Out-patient Care	MEAN	SD
days/wk	3	2
hrs/wk	20	15
% out-patients	72	30
% in-patients	25	29
# exam rooms	3	2
	COUNT	%
Mobile teams	2	5

COUNT = out of 44 team participants

Std = standard deviation

Only two teams were formed in the past year, with the majority in existence for over 10 years. Most teams are located in out-patient clinic departments within hospitals. The average time that teams treat out-patients is 3 days per week

for 20 hours per week; however, the variation is high. Over 70% of all the teams' time is spent treating out-patients with wounds. A total of 2 teams were defined as mobile. This is defined as not having a dedicated space to treat wounds but

where different disciplines share the responsibility of wound care across different

hospital locations/campuses.

Table 1.2: Access to Diagnostic and Wound Treatment Modalities

Onsite Diagnostics Available to Teams	COUNT	%
Microbiological tests	39	89
Ultrasound	28	64
Wound biopsy	28	64
X-ray	28	64
Bone culture	25	57
CT scan	22	50
Other tests (e.g. ABPI, MRI, nuclear medicine)	13	30
Onsite Treatments Available to Teams		
Debridement	44	100
Off-loading	34	77
Orthotic casting	26	59
Negative pressure therapy	24	55
Other specialized treatment (e.g. electrosurgery, foot scale)	14	32
Ultrasound	12	27
Marsupialization	10	23
Electrical stimulation	8	18
Hyperbaric Oxygen Therapy(HBOT)/Topical Oxygen Therapy (TOT)	5	11
Whirlpool	4	9
Phototherapy	2	5
Pulse lavage suction	2	5
Availability of Wound Healing Best Practice Guidelines		
Electronic	33	75
Paper	28	64
Wall chart	12	27
Other	1	2
Team Use of Telemedicine		
NO	23	52
YES	20	45

All teams offered onsite debridement of wounds. Over 75% offered off-loading and almost 60% of teams offer orthotic casting. Other specialized treatments included: electrosurgery, electrocautery, ultrasonic debridement, amputation, digital amputation, ultra-sonic versa jet, access to chronic wound in-patient bed, dressings, foot scale, FREMES and casting/splints.

The majority of teams had access to wound healing best practice guidelines (BPG). The majority also provided both electronic and paper versions of BPGs. Other forms of BPG included materials provided by vendors.

Almost 50% of teams utilize telemedicine. This mainly involved use of a video link for patient consultation and management. Two teams utilize a video link for clinician education only.

Team Capacity

Table 2: Team Capacity

	MEAN	SD
Unique patients seen/year	579	609
Total number of patient visits/year	2000	2679
New patients seen/year	282	224
Follow-Up (months)	7	6

Teams see an average of 579 patients per year, an average of 2000 patient visits per team each year and an average of 282 new patients per year. On average, teams follow patients for approximately 7 months. However, there is great variability across teams. In some instances teams followed patients for several years while other teams only followed patients for 3 months. Reasons for this variability in follow up were not apparent.

Population Served

Table 3.1: Wound Characteristics

Acute vs. chronic wounds treated by team	%	STD
Acute wounds	25	22
Chronic wounds	75	22

Types of chronic wounds referred to teams	MEAN	STD
Diabetic neuropathic ulcers	30	25
Pressure ulcers	15	23
Diabetic ischemic ulcers	15	12
Venous ulcers	13	11
Arterial ulcers	7	7
Mixed etiology	7	7
Surgical wounds	6	14
Inflammatory wounds	4	6
Malignant wounds	3	8
Other wounds (e.g.pyoderma)	1	4

75% of team time is spent treating chronic vs. acute wounds. Almost 50% of wounds that are referred to teams are diabetes related.

Table 3.2: Patient Costs for Priority Treatment Interventions

Patient payment methods (%) for priority treatment interventions	MEAN	SD
Out of pocket	23	25
Private insurance	22	24
Pay other (NIHB, WSIB etc)	12	22
ODSP	11	12
No access	11	17
AADP	7	9

Table 3.2 refers to the means by which clients pay for priority interventions related to wound care (e.g. off-loading for diabetes related foot

ulcers, compression stockings for venous leg ulcers). Over 20 out of 44 teams reported that clients must pay out of pocket for specialty treatments or must pay through private insurance. The remaining patients access support from the Ontario Disability Support Program (ODSP), Access Assistive Devices Program (AADP) or have no access to funding for products required to treat existing, or prevent recurrent wounds. Other sources of funding accessed by patients include Worker’s Safety Insurance Board (WSIB), Veterans Affairs, Non-insured health benefits (NIHB), native affairs, donations, hospital funds when available, private donations. On average, 7% of patients drop out of team care. The most common reasons stated were limited access to transportation, cost of transportation, and non-adherence.

General Service Models

Table 4: General Service and Funding Models

Discipline of Team Lead	COUNT	%
MD (GP/FP)	9	20
MD-Internist	8	18
MD-Plastic surgeon	3	7
MD-infectious diseases	2	5
MD-Dermatologist	1	2
MD-General Surgeon	1	2
MD-Vascular surgeon	1	2
Co-leads-Vascular surgeon and infectious disease	1	2
Advance Practice Nurse	3	7
RN-no formal training in wound care	2	5
RN-with training	2	5
Enterostomal Therapist	7	16
Co-leads MD&RNw/trg	2	4
Chiropracist	2	5
Time lead is present with team treating patients with wounds	MEAN	SD
Days/wk	2	2

Disciplines on Team	COUNT	%	MEAN (hrs/week)	SD
Medicine				
Family/General Practice	13	30	17	16
Plastic surgery	10	23	11	11
Internal Medicine	9	20	10	15
Infectious disease	8	18	7	10
Vascular surgery	6	14	4	3
Dermatology	3	7	25	13
General surgery	3	7	7	4
Geriatrics	2	5	8	4
Hematology	1	2	12	
Orthopedic surgery	1	2	1	
Palliative Care	1	2	10	
Physiatry	1	2	30	
Radiation oncology	1	2	4	
Radiology	1	2	16	
Research	1	2	8	
Nursing				
RN with training	18	41	24	26
RN with NO training	15	34	22	22
Enterostomal Therapy	11	25	10	10
RPN with NO training	7	16	51	62
Advanced practice nurse	4	9	37	55
RPN with training	1	2	5	
Research RN	1	2	18	
Allied Health				
Chiroprody	16	36	15	25
Occupational therapy	12	27	3	2
Social work	11	25	15	35
Dietician	10	23	10	25
Physical therapy	9	20	2	1
Other				
Administrative support	19	43	39	35
Orthotic technologist	11	25	15	21
Pedorthist	9	20	18	25
Pharmacist	2	5	16	21
Ergotherapist	1	2	1	
Hyperbaric oxygen technologist	1	2	100	
Orthotist	1	2	6	
Research Coordinator	1	2	20	

Team funding sources	COUNT	%
Hospital funds	29	66
Other fund source (e.g. in kind time, research funds etc.)	19	43
Private funds	5	11

Patient follow-up	COUNT	%
Individualized	41	93
Prescribed	3	7

The majority of teams have an MD as a lead. In some instances the teams have co-leads. In most instances where a team has co-leads the responsibility is shared between a nurse and a physician. An RN with training has been defined as a nurse who has taken a course/certification in wound care.

On average team leads are present 2 days out of the week, but there is substantial variation. The

above shows the distribution of disciplines across all 44 teams. The columns on the right depict the number of hours worked per week per discipline and corresponding standard deviation. The majority of teams are funded through hospitals. Other funding sources include Family Health Teams, OHIP billing, research education funds and charitable donation. Over 90% of teams schedule follow-up visits based on individual need.

Referral Pathways

Table 5.1: Referral Pathways to Team 1) MD of any kind 2) Nursing of any kind 3) Allied Health 4) Other which includes: CCAC, chiropodist, patient self referral, LTC.

Who refers to the team?	COUNT	%
MD	43	98
Nurse	16	36
Other	9	20
Allied Health	3	7

The majority of teams receive referrals from MDs, but the variation is quite high as far as the different disciplines which refer.

The average wait time for patients to be seen by teams is 23 days with a high standard deviation.

Table 5.2: Referral Pathways from Team

Where team refers to:	COUNT	%
Infectious disease on site	19	43
Infectious off site local	17	39
infectious off site distant	16	36
Any access	44	100
General surgeon on site	22	50
General surgeon off site local	13	30
General surgeon off site distant	3	7

Any access	36	82
Vascular surgeon on site	14	32
Vascular surgeon off site local	21	48
Vascular surgeon off site distant	17	39
Any access	44	100
Plastic surgeon on site	18	41
Plastic surgeon off site	18	41
Plastic surgeon off site distant	13	30
Any access	41	93
Orthopaedic surgeon on site	19	43
Orthopaedic surgeon off site local	22	50
Orthopaedic surgeon off site distant	12	27
Any access	44	100
Dermatologist on site	10	23
Dermatologist off site local	26	59
Dermatologist off site distant	9	20
Any access	43	98
Endocrinologist on site	15	34
Endo off site local	16	36
Endo off site distant	7	16
Endo other	1	2
Any access	37	84
Diabetologist on site	16	36
Diabetologist off site local	18	41
Diabetologist off site distant	5	11
Diabetologist other	1	2
Any access	37	84
Radiology on site	28	64
Radiology off site local	15	34
Radiology off site distant	2	5
Any access	44	100
Microbiology on site	30	68
Microbiology off site local	13	30
Microbiology off site distant	2	5
Any access	43	98
Physical therapy on site	27	61

PT off site local	15	34
PT off site distant	2	5
Any access	42	95
Comprehensive nutritional assessment on site	20	45
CNA off site local	17	39
CNA off site distant	1	2
CNA other	1	2
Any access	38	86
Orthopedic support on site	25	57
Ortho off site local	17	39
Ortho off site distant	3	7
Any access	42	95
Occupational Therapy on site	24	55
OT off site local	12	27
OT off site distant	4	9
Any access	38	86
Wound management specialist on site (any MD that self identifies as specializing in wounds)	20	45
Wnd mgmt off site local	6	14
Wnd mgmt off site distant	8	18
Any access	32	73
Other on site	12	27
Other off site local	8	18
Other off site distant	7	16
Any access	13	30

On site is defined as located where the team practices (e.g. within the hospital).

Off site local is defined as located within the city where the team is.

Off site distant is defined as located outside of the city of where the team is.

Any access is defined as a team having any access (either on site, off site local or distant) to specified care e.g. infectious disease

Other specialties referred to include: orthotist, geriatrician, chiropract, pedorthist, kinesiologist, fracture clinic, seating clinic, ET, HBOT.

Table 6: Team Communication

Communication modes from team to GP/FP	COUNT	%
Written	37	84
Fax	21	48
E-mail	11	25
Phone	9	20
If e-mail: send photos?	5	11
Other (e.g. in person, CCAC)	5	11

Rely on patient	5	11
Communication modes from team to CCAC Case Manager		
Written	30	68
Fax	23	52
Phone	19	43
Rely on patient	9	20
Other (e.g. onsite case manager, primary nurse)	5	11
E-mail	2	5
If e-mail: send photos?	1	2
Communication modes from team to Primary Nurse in the community		
Written	36	82
Phone	22	50
Fax	21	48
Rely on patient	14	32
E-mail	2	5
If e-mail: send photos?	1	2
Other (CCAC)	1	2

Hand written notes and faxes are the most common modes of communication between teams and GPs, CCAC case managers, and

primary nurses in the community, with online communication being least common

Education for Patients & Family/Informal Caregivers

Table 7: Education for Patients and Family/Informal Care Givers

Education for patients	COUNT	%
Yes	43	98
No	1	2
If yes, what type of education:		
Informal Education	41	93
Structured Education	27	61
Education for caregivers		
Yes	44	100
If yes, what type of education:		
Informal Education	43	98
Structured Education	25	57

Almost all teams provide patient education. Almost all education provided is informal. Informal education has been defined as ad-hoc review and exchange of information either over the phone or in-person. Structured education has been defined as learning materials (videos,

written materials, presentations, personalized orders). All teams provide education to caregivers with almost all teams providing informal education. Over 50% of all teams provide structured education.

Table 8: Follow-Up Services for Patients and Caregivers

Follow-up services for patients provided?	COUNT	%
Yes	37	84
No	7	16
If yes, what type:		
Call from patient	41	93
Calls from team	20	45
Self-monitoring with phone follow-up	12	27
Other (e.g. website, home visits, via community nurse etc.)	10	22
Support-line	10	23
Online contact from patient	8	18
Page from patient	6	14
Follow-up services for caregivers provided?	COUNT	%
Yes	37	84
No	7	16
If yes, what type of follow-up:		
Call from caregivers	39	89
Calls from team	15	34
Self-monitoring with phone follow-up	13	30
Support-line	12	27
Online contact from caregivers	8	18
Page from caregivers	6	14
Other (e.g. website, contact via community nurse)	2	5

Over 80% of teams provide follow-up services for patients. Almost half of this is in the form of calls from the team followed by support-line and self-monitoring with phone follow-up. A support line is defined as a dedicated phone number for the team. The team either responds directly or calls the patient back. Other forms include: website, home visits, and contact via community nurses.

Over 80% of teams provide outreach services for caregivers. Over 30% of teams call patients followed by self-monitoring with phone follow-up and support-line. Other forms include: website and contact via community nurses. All teams provide in-reach services for patients with the main form of in-reach being calls. The other forms of in-reach include: via community nurse and in-person.

All teams provide in-reach services for caregivers with the main form of in-reach being

phone calls. The other forms of in-reach include: via community nurse and in-person.

Peer Support

Table 9: Peer Support

Peer support offered by team?	COUNT	%
No	40	91
Yes	4	9
If no, Do you feel that a peer support group would be helpful?	31	70

Most teams do not provide peer support for patients with chronic wounds, or their family caregivers. Although team support is not typically provided, most teams (70%) felt it would be helpful.

The survey closed with two open ended questions asking team leads to describe what they felt were facilitators and barriers to effective wound care. Responses to these questions are cited below. **Points that have been bolded are those which almost all teams cited.**

1. *Question: Why is your team effective at wound management?*

Responses:

- **Supportive team dynamic and mutual respect of team members who are dedicated to what they do**
- **Advanced wound knowledge of team members and emphasis on clinical education for team members**
- Patient education is a key pillar of team approach
- Early detection of wounds
- Evidence based and research centered approach to clinical care
- Onsite off-loading and specialties key in effectively treating wounds
- Consideration of patients full life-course and history is key in order to ensure medication adherence
- Hospital support e.g. space, funds, staff time, onsite diagnostics etc.
- **Multi-disciplinary aspect of treatment is vital**
- Patients can access team quickly
- Low turnover on team ensures consistency of care for patients
- Access to in-patient beds is an asset
- Team collaboration with other wound care experts

2. *Question: What are the challenges to effective wound treatment?*

Responses:

- **Lack of resources e.g. time, space, funds, disciplines, onsite diagnostics, onsite specialized treatments, funds for clinician education etc.**
- Delay in treatment if approvals required by MDs
- **No per patient funding**

- **Need dedicated wound care portfolios for team**
- Patient adherence e.g. cultural barriers
- Limited access to home care, need more patient support in the community
- Geographic isolation of populations in need
- Late detection of wounds creating very complex and difficult wounds that develop and are difficult to treat
- Financial aid for home-care products e.g. compression stockings
- High turnover rate in clinical staff and community nurses causes inconsistencies in care and may cause patient non-adherence due to lack of trust and frustration and conflicting information
- Very few team members causing staff to burn out quickly
- No dedicated funds for team to have formal infrastructure and more dedicated time
- Low healing rates
- Lack of support from other medical professions and clinicians
- Desperately need education for clinical staff that is accessible and affordable
- Complex patient co-morbidities
- No funding for ambulatory care
- Lack of consistent care in community nursing and LTC
- Medical fee structure is not conducive to treating out-patient wounds in Ontario
- Many patients do not have an FP/GP so patients can be lost to follow-up
- Long wait time to see specialist/surgeon
- Need funding for preventative care e.g. off-loading
- Patient access to teams e.g. patient transportation to teams
- Lack of funds and insurance coverage means that patients have no access to required devices and treatments

Access to clinics may be referral based only causing an accessibility issue if patients cannot refer themselves.

Discussion

Distribution of wound teams across Ontario

We located 49 multi-disciplinary wound teams throughout the province. Wound teams were located within each LHIN, but the distribution of wound teams amongst LHINs varied widely, with LHINs such as HNHB having 6 teams and Waterloo Wellington only 1 team. The number of teams is not commensurate with the provincial population distribution. At this juncture there may be certain LHINs which are underserved.

Of the 49 MDWCTs identified only 2 have formed in the past year. By 2026, when many of the baby boom generation will be retired, the proportion of elderly individuals will increase from the current 13.2% to 21.2% (Foot, 2007). Elderly patients are at high risk of developing wounds because of immobility (Allman et al. 1995; Baumgarten et al. 2006; Gunningberg et al. 2000), poor nutritional status (Allman et al. 1995), impaired mental status (Reed et al. 2003), and incontinence (Baumgarten et al. 2006; Reed et al. 2003). The percent of patients reporting these deficits increased over 15 years, from 9.1% in 1994 to 17.2% in 2008 (VanDenKerkhof et al. 2011). These trends indicate that demand for wound care services will increase as our population continues to age suggesting that the development and successful implementation of new teams will be integral to treating the increasing demands of patients with wounds in Ontario.

Overall, our results suggest that MDWCTs are present in all LHINs, but the number and locations of these teams limit access to services and may not meet the present and future needs of Ontario's ageing population.

Composition & location of wound teams within health facilities

The majority of teams are located within, and funded by, hospitals. While hospital-based teams can access specialist care on site, they must also compete for the hospital's fixed pool of resources with other, often better established clinical disciplines (cardiology, orthopaedics, and oncology). In general, dedicated funding is not provided for wound care teams.

Allied health services provided by dietitians, OTs, PTs, chiropodists, orthotists, and orthopaedic technicians are often not available. This may be an impediment to healing considering the number of patients with diabetes and lower extremity wounds.

Variation in patient services provided by wound teams

Almost half of wound cases referred to wound care teams are diabetic lower extremity wounds. The majority of teams reported that they did not have onsite access to offloading services (orthotists) or, comprehensive vascular investigation, the primary interventions used for wound treatment. Most teams do not have dietitians and endocrinologists on site.

Half of all clinics reported having access to a casting lab trained in total contact casting. Total contact casting has been identified as the gold standard to off-load pressure and yields the highest healing rates for those with diabetic foot wounds (Spencer, 2004; RNAO, 2007). The provision of specialized foot care may be a critical component for prevention and treatment of chronic wounds. Early recognition and management of diabetic foot complications that contribute to lower limb amputation is also critical and noted as lacking in our survey results (Driver & Griffis, 2007).

Some teams have Ankle Brachial Pressure Index (ABPI) Doppler ultrasound available but results may not be reliable in those patients with long term history of diabetes, smoking, hypertension or the very elderly who may have calcification and non-compressible vessels resulting in falsely elevated readings (Apelqvist et al. 1989). Moreover, studies have shown that ABPI should not be the only test available to determine perfusion status (Romanelli et al. 2007). Toe pressures are recommended as a minimum standard to determine perfusion status if calcification is suspected (Frykberg et al. 2000; Kravitz et al. 2003). Toe pressures or toe photoplethysmography is a more accurate measure of perfusion status as vessels in toes are less likely to be damaged by calcification.

Other vascular tests recommended which were not reflected in the respondents' data include arterial duplex ultrasound which has sensitivity and specificity rates greater than 90% to identify obstructions which may benefit from angioplasty (Goldman & Salcido, 2002). Tcp02 is also a valuable investigation technique to evaluate limb perfusion status. (Fraser & Houghton, 2007).

Patient access to teams

Patients must often pay for specialized wound treatments through insurance plans or out-of-pocket payments, leaving many without access to required treatments. Currently the Community Care Access Centers (CCAC) covers the cost of nursing visits, but at this time does not cover offloading, which is a necessity for diabetic foot ulcer treatment, or compression stockings, which are required to prevent recurrent venous stasis ulcers.

According to best practice guidelines, patients with diabetic foot ulcers (45%) need offloading services and devices. Patients with venous leg ulcers (13%) need compression therapy. There is high quality clinical and economic evidence supporting these interventions for the target populations (Iglesia et al. 2004). Currently there is no public health insurance coverage for these interventions. The lack of per patient funding has been identified by most teams as one of the

challenges they face in managing chronic wounds, leading to costly follow-up visits and prolonged service duration with the teams, CCACs and provider agencies.

Access to existing wound care teams appears to be limited with an average wait time of 23 days (SD: 34 days). There are however multiple sources of referral to teams.

Teams also refer patients to multiple sources for additional care. However, access to nutritional assessment and social work appears to be inadequate. Because social workers could facilitate patients' access to funding sources for off-loading devices and compression therapies, the lack of social work involvement in existing teams' activities is a concern. One possible solution is the use of telemedicine for consultation with these disciplines. Current only a few teams put this remote technology to use in their wound care practice.

Respondents also indicated that a main reason for patient drop-out was access to transportation. In several instances transportation was cited as the main attributor to lack of access to wound teams.

Psycho-social support and treatment adherence

Psychosocial issues are paramount in chronic wound management. Studies have shown that chronic wounds have a significant impact on quality of life and cause substantial burden to patients. In particular, PrUs significantly affect physical, social, psychological, and financial aspects of patients' quality of life yet very few teams reported having social work or psychological services represented (Gorecki et al 2009). The majority of teams suggest that a peer support program would be helpful to patients and their family although less than 10% of the team currently provide peer support. An evidence synthesis examining the effectiveness and cost-effectiveness of peer support programs for chronic and community wound care would be informative.

Conclusion

Phases one and two of this field evaluation suggest that wound care is not consistent, comprehensive, or coordinated across settings and regions in Ontario. Phase 3 of this field evaluation is underway and will help clarify the clinical and cost effectiveness of multi-disciplinary teams

Specialized multi-disciplinary teams for the management of chronic wounds exist within every CCAC region in Ontario. However, there is wide variation in team accessibility, service models, and team characteristics. The training of team members is highly variable, with most members lacking formal education in the management of chronic wounds.

Almost half of all wounds referred to specialized wound care teams are diabetic lower extremity ulcers, yet only one quarter of teams are able to offer these patients ready access to a dietician. Despite the recognized complexity of chronic wound management and its dependence on patient adherence to prescribed treatments, teams rarely offer services addressing the social needs of patients and their family caregivers, following traditional medical models that tend to overlook the importance of social factors in chronic disease management.

Communication between specialized multidisciplinary wound care teams and primary care providers who share responsibility for the patient with a chronic wound is rarely electronic. A shared electronic information system across settings and geographic regions supporting the development of a provincial wound database would enable teams to work collaboratively to provide co-ordinated, comprehensive, evidence-based care to patients with chronic wounds

As a result of interest generated by phases one and two of this field evaluation, THETA members are collaborating with wound care interest groups in the planning and implementation of an on-line forum to permit information sharing amongst those with an interest in chronic wounds, be they patients,

family members, clinicians, researchers, or policy makers.

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Appendices

APPENDIX A: Hospital and CHC Script

Methods on IWC calls:

1. *When calling hospital receptionist say:*

“Hello, my name is _____, and I am calling from the University of Toronto. We are beginning a study funded by the Ministry of Health to identify multidisciplinary wound care teams. Is there an outpatient wound care team at your hospital?”

If prompted to explain what that is, then ask:

“Out-patient MDWCTs have a minimum of 2 members with advanced training in wound care representing a minimum of 2 different clinical disciplines (e.g., a dietician, a physiotherapist, an occupational therapist, a chiroprapist, an orthotist, a physician, a nurse), who share responsibility for the community based patient with a wound.”

If they say yes, then ask::

“Could you please put me through to the team?”

If they say no, then ask:

“May I please speak to the wound care nurse?”

[If no wound care nurse, ask for ET]

[If no ET, then ask for plastic surgery]

[If no plastic surgery, ask for chiroprapist]

[If no chiroprapist, ask to talk with anyone who specializes diabetic pts. (sometimes a clinic, nurse, nutritionist etc.)]

2. *After being transferred to either the practitioner:*

“Hello, my name is _____, and I am calling from the University of Toronto. We are beginning a study funded by the Ministry of Health to identify multidisciplinary wound care teams. Is there an outpatient wound care team at your hospital?”

If they say yes, then ask:

“Is it multidisciplinary?” i.e. a minimum of 2 members with advanced training in wound care representing a minimum of 2 different clinical disciplines (e.g., a dietician, a physiotherapist, an occupational therapist, a chiroprapist, an orthotist, a physician, a nurse), who share responsibility for the community based patient with a wound.”

If they say yes, then ask:

“Would you be able to provide a name, contact number, and email address for the team lead?”

If they say:

“we don’t have one at the hospital we use CCAC/external hired nurse”

Then ask:

Are you aware of whether the CCAC/ external hired nurse work with a multi-D team?

If they say yes or I don’t know, then ask:

“Would you be able to provide a name, contact number for the nurse/CCAC case manager/office etc?”

-Proceed to call nurse at provided contact and attempt at the standard of 3x with a message left on voicemail each time.

Close all interviews by asking:

“Do you know of any MDTs in your LHIN?”

If they say yes, then ask:

“Would you have their contact info?”

“Thank you very much for your time!”

APPENDIX B: FHT Script

1. When calling FHT receptionist:

Hello, I am calling from the University of Toronto regarding a study funded by the Ministry of Health which is looking to identify wound care teams in the province.

Do you have an out-patient wound care team at your FHT?

[If yes]

Is the team multidisciplinary? *(Two or more disciplines, sharing responsibility for the patient)*

Who is the team lead? *(ask for contact info)*

Do you know of any other out-patient MDWCTs in your LHIN? *(ask for contact info)*

[If no]

May I please speak to the wound care nurse?

[If no wound care nurse, ask for chiropody]

[If no chiropody, then ask to talk with anyone who specializes in dealing with diabetic pts. (nurse, nutritionist etc.)]

2. After being transferred to the practitioner:

Hello, I am calling from the University of Toronto.

We are beginning a study funded by the Ministry of Health to identify multidisciplinary wound care teams in the province.

I would just like to know if there is an out-patient wound care team at your FHT.

[If yes]

Is the team multidisciplinary? *(Two or more disciplines, sharing responsibility for the patient)*

Who is the team lead? *(ask for contact info)*

Do you know of any MDWCTs in your LHIN? *(ask for contact info)*

Thank you very much for your time!

APPENDIX C: Initial Email to CCACs

Hello []

As you may already be aware, THETA will soon be conducting a study on behalf of the Ontario Ministry of Health and Long-Term Care (MOHLTC) that is investigating the effectiveness and cost-effectiveness of multidisciplinary wound care clinics across the province.

The first phase of this study is to identify specialized multidisciplinary wound clinics across Ontario. We are asking each CCAC to share contact information of clinics that house two or more disciplines with an interest or specialization in wound care. We will then be contacting each clinic directly in order to understand their current service models.

It would be greatly appreciated if you would begin to think about any known clinics in your catchment area. Next week, you will receive a follow-up call from Laura who is assisting me with the study over the summer. If you have any questions in the meantime, you can email her at laura.rosen@theta.utoronto.ca.

Many thanks in advance,

Anita

APPENDIX D: Initial Phone Call to CCACs

Hello, my name is _____, and I am calling about the multidisciplinary wound care clinic study being conducted at the University of Toronto on behalf of the MOHLTC.

I am following up on the e-mail invitation that was sent to you on [date] by [].

As outlined in the email, our goal is to evaluate the effectiveness and cost-effectiveness of multidisciplinary wound care clinics in the province. To do so, however, we first need to identify where these clinics are and how they currently function.

We are looking specifically for clinics that house two or more disciplines (such as nursing, medicine, nutrition, etc.).

Have you had a chance to think about where some of these clinics may exist in your LHIN?

If so, obtain information. Then continue:

-Are there any CCAC specific clinics in your area?

-Do you know of any hospitals that house outpatient clinics?

-Are there any Family Health Teams that you know of with a wound care specialty?

-Are you aware of any private clinics in your area?

Thank the interviewee for the information, then:

Because our task is quite large, we realize that this list is not necessarily comprehensive. The contacts you have provided will serve as a starting point for a referral method of identifying the remaining wound care clinics across the province.

Is there anybody else you recommend we speak with in order to help identify these multidisciplinary wound care clinics?

Thank you for your time, and please feel free to contact us if you have any questions or more information to share. We look forward to speaking more with you as the study develops (?)

APPENDIX E: Initial Voicemail/Second Phone Call to CCACs

My name is Laura Rosen, and I am calling from the THETA Collaborative at the University of Toronto. I just wanted to follow up with the email I had sent you last week in regards to multidisciplinary wound care clinics in your catchment area. I will try you again at the end of the week, or you can call me at 416-978-0382 starting Monday. You can also feel free to email me at laura.rosen@theta.utoronto.ca

Thank you.

APPENDIX F: Second Email to CCACs

Hi [],

I am contacting you in order to follow up with the email and voicemail message that you received in the last couple weeks.

Just to clarify, we are looking to identify clinics that provide wound care and have access to more than one discipline. These clinics may or may not be CCAC-funded. Examples may include hospital outpatient clinics or free-standing clinics. We are trying to get a picture of where wound care patients in Ontario receive their care, and are contacting each CCAC as a first step in understanding common service pathways.

Please send us the names and contact information for any clinics that fit this multidisciplinary profile or of anyone that could provide more information about wound care in your LHIN. We would be very grateful for this information.

Thank you,

Laura Rosen

APPENDIX G: CCAC contact/leads Script

Methods on IWC calls:

3. *When calling say:*

“Hello, my name is _____, and I am calling from the University of Toronto. We are beginning a study funded by the Ministry of Health to identify multidisciplinary wound care teams. Is there an outpatient wound care team at your site?”

If prompted to explain what that is, then ask:

“Out-patient MDWCTs have a minimum of 2 members with advanced training in wound care representing a minimum of 2 different clinical disciplines (e.g., a dietician, a physiotherapist, an occupational therapist, a chiroprapist, an orthotist, a physician, a nurse), who share responsibility for the community based patient with a wound.”

If they say yes, then ask::

“Could you please put me through to the team lead?”

After being transferred to the lead:

Hello, I am calling from the University of Toronto.

We are beginning a study funded by the Ministry of Health to identify multidisciplinary wound care teams in the province.

I would just like to know if there is an out-patient wound care team at your site.

[If yes]

Is the team multidisciplinary? *(Two or more disciplines, sharing responsibility for the patient)*

Who is the team lead? *(ask for contact info)*

Do you know of any MDWCTs in your LHIN? *(ask for contact info)*

Thank you so much for your time!

APPENDIX H: Notice for CAET/CAWC/RNAO newsletter posting

The Toronto Health Economics and Technology Assessment Collaborative (THETA), funded by the Ministry of Health and Long Term Care, is conducting a research study to investigate the effectiveness and cost-effectiveness of specialized multidisciplinary wound care teams (MDWCTs) for community based patients with chronic wounds across Ontario. MDWCTs are defined as

teams having a minimum of 2 members with advanced training in wound management, representing a minimum of 2 different clinical disciplines (e.g., dietician, physiotherapist, occupational therapist, chiroprapist, orthotist, physician, nurse, social worker), who share responsibility for the community-based patient with a chronic wound.

This study consists of 3 phases: Phase 1-identification of teams; Phase 2-survey of teams; Phase 3-a pragmatic trial. We need your help with Phase One. If you are aware of a multidisciplinary wound care team in Ontario please contact **Anita Stern** with your contact information including your name, facility name, location, address, phone number and email address. Thank you for your assistance.

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APPENDIX I: Phase II survey

I. Team characteristics

a. How many years has your team been in operation?

< 1 year

1 year - < 5 years

5 years - < 10 years

10 years or more

b. Is the team located:

Within a hospital

Free-standing clinic

Other Please describe:

c. How often does your team see out-patients? _____ days/week _____ hrs/week

d. % of team's time seeing out-patients with wounds? _____

e. % of team's time seeing in-patients with wounds? _____

f. How many examination rooms are used for wound care at your site?

g. What types of onsite diagnostics are available? (Please check all that apply)

Bone culture

CT scan

Microbiological tests

Ultrasound

- Wound biopsy (histopath, immunofluorescence)
- X-ray
- Others →please list: _____

h. What types of onsite specialized treatments are available? (Check all that apply)

- Electrical stimulation
- Negative pressure wound therapy
- Orthotic casting
- Offloading
- Hyperbaric Oxygen Therapy/Topical Oxygen Therapy
- Phototherapy
- Pulse lavage with suction
- Pulse radio frequency stimulation
- Ultrasound
- Whirlpool
- Debridement (sharp debridement, curettage)
- Marsupialization
- Others →please list: _____

i. Are wound healing best practice guidelines available for clinician reference?

Electronic

Paper based/Booklet

Wall Chart

Other Please describe: _____

j. Does your team use telemedicine (e.g., video links, store and forward technology)?

No

Yes Please describe:

II. Team Capacity

a. How many patients are seen annually by your team?

b. What is the total number of patient visits per year?

c. How many new patients does your team see each year? _____

d. How long, on average, are patients cared for by your team? ____

III. Population Served(OUT PATIENTS ONLY)

a. What is the proportion of acute vs. chronic wound (i.e. a wound that has not healed by 30% in 4 wks) patients seen by your team?

% Acute Wound Pts.-

% Chronic Wound Pts.-

b. What is the distribution of *chronic wounds* that are typically referred to your team?

- Pressure ulcers _____%

- Venous ulcers _____%
- Arterial ulcers _____%
- Ulcers of mixed etiology (arterial and venous) _____%
- Diabetes related ischemic ulcers _____%
- Diabetes related neuropathic ulcers _____%
- Malignant wounds _____%
- Inflammatory wounds (Vasculitis, etc.) _____%
- Surgical wounds that have become chronic _____%
- Other _____% Please describe:

c. For patients requiring priority treatment interventions (e.g. off-loading for diabetes related foot ulcers, compression stockings for venous leg ulcers), please describe the proportion of clients who :

- i. Pay out of their personal pockets _____%
- ii. Have private health insurance _____%
- iii. Have Ontario Disability Support Program _____%
- iv. Access Assistive Devices Program coverage _____%
- v. Are not able to access required treatment interventions due to lack of funding _____%
- vi. Other _____% please describe: _____

d. If you follow-up patients, do you have any indication of the percentage that drop out?

e. What are the most common reasons for patients dropping out?

IV. General Service Model

a. Team leader

i. What is the discipline and qualifications of your team leader?

ii. How many days per week is the leader present?

b. Please list all disciplines represented on your team, the number of staff representing each discipline, and the hours/week worked by each: MD, nursing (specify Enterostomal Therapist (ET), RN without ET designation, or RPN), chiropodist, podiatrist, OT, PT, orthopaedic technician, nutritionist, social work, secretarial support, etc.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

c. What is the funding source of your team?

Hospital

Private

Other please describe:

d. Do you schedule follow-up visits according to a prescribed schedule, or is it individualized?

V. Referral pathways

a. Please describe how patients are referred to your team (i.e. when the referral is made, by whom, average wait time to be seen)

b. Where are patients referred to from your team and where is this specialty care offered? (Please check all that apply)

	On Site	Off Site (local i.e. within same city)	Off Site (distant i.e. requires travel to another city)	Other (Please specify)
Infectious diseases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
General Surgery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
Vascular Surgery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
Plastic Surgery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
Orthopaedic Surgery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____

Dermatology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Endocrinology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Diabetology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Radiology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Microbiology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Physical Therapy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Comprehensive Nutritional Assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Orthopaedic Support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Occupational Therapy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Wound management specialist MD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

c. After seeing the client, how do you communicate treatment plans with the client's GP, primary nurse in the community, and case manager?

GP

Telephone update

Fax

Written summary

E-mail

If yes to email, do they email digital photos yes/no

Rely on patients

Don't communicate

Other Please describe:

Case Manager

Telephone update

Fax

Written summary

E-mail

If yes to email, do they email digital photos yes/no

Rely on patients

Don't communicate

Other Please describe:

Primary Nurse in the Community

Telephone update

Fax

Written summary

E-mail

If yes to email, do they email digital photos yes/no

Rely on patients

Don't communicate

Other Please describe:

VI. Education for patients, and family/ informal care givers

a. Does the team provide education or support for patients to improve adherence to the treatment plan?

No

Yes

If 'yes', what type of education or support is provided?

Structured Please describe:

Informal Please describe:

Other Please describe:

b. Does the team provide education or support for family/informal caregivers to improve adherence to the treatment plan?

No

Yes

If 'yes', what type of education or support is provided?

Structured Please describe:

Informal Please describe:

Other Please describe:

c. Do you provide outreach services for patients?

If yes, in what format?

Follow-up telephone calls placed by team to patients

Telephone support line patients can access to call the team

Self-monitoring with telephone follow-up

Other (please specify)

d. Do you provide outreach services for family/informal caregivers?

If yes, in what format?

Follow-up telephone calls

Telephone support line

Self-monitoring with telephone follow-up

Other (please specify)

- e. Do you provide in-reach (ie: patients contact your team directly) services for patients if they have concerns?
- f. Do you provide in-reach services for family/informal caregivers? If yes, how can they reach you?

Direct phone call

Page

Online

Other Please describe: _____

VII. Peer Support

Are there any peer support programs offered by your team for patients with chronic wounds, or their family caregivers? Yes/no

If yes, please describe.

If no, do you feel a peer support program would be helpful? Yes/no

VIII. Team Effectiveness/Challenges in Effectiveness

(open ended questions):

1. In your opinion, why is the team effective in wound management?
2. In your opinion, what are the challenges in effective wound management by the team?

You have reached the end of the questionnaire. Thank you very much for your participation!

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