Background

Ontario faces an aging population, this is especially apparent in Sudbury where we have a high population percentage of older adults at 18.4%, which is 1.7% higher than the provincial average of 16.7% (Census 2016). Older Adults drive health care costs – 50% of our health care spending occurs on their behalf (Sinha 2013). Compounding our aging population, North Eastern Ontario is projected to have the **highest** growth of seniors who have the **highest** ratios of chronic disease, such as Diabetes, Hypertension and Cardiovascular Disease (CIHI 201). Current demographics will see increased demand on our healthcare system and will impact Paramedic Services response capacity due to these demands.

Reconceptualising the Paramedic as a Mobile Health Provider

Community Paramedic (CP) programs were established initially in the east coast and then the western areas of Canada, they exhibit great successes in the creation of ingenious yet simple strategies to meet the needs of their patients in the comfort of their homes. Historically Paramedics have been seen solely reactive, as a responder to an emergency medical situation; but with our mobility, high level of training and ever expanding scope of practice CP programs are perfectly poised to deliver proactive education and treatments in the community.

Paramedics are no longer just an advanced first aider; this profession has evolved with a high level of clinical training and education. A Paramedic can perform more procedures than most regulated health care professionals, doctors aside, in the field. Now, with this next level of evolution, Paramedics are using this knowledge and experience and applying it to providing clinical interventions in a patients' home that the home care Registered Nurses (RNs) cannot. We are specially trained for this work, we are mobile and a Paramedics comfort zone is provision of care outside of a reliable hospital setting.

The Ontario Health Care system and our citizens are reconceptualizing the Paramedic as a Mobile Health Provider who provides not only emergency response treatment but also; Public safety education, Health Promotion/Community advocacy, Health support/contingency management and bridging to primary health care. This work improves the quality of life for our patients allowing them to live more healthfully and longer in their homes; it lowers 911 call volumes and decreases emergency department utilization and hospital readmission rates.

Sudbury has two separate CP programs:

- Health Promotion Community Paramedic (HPCP) program who works with the principles of prevention and advocacy; and,
- Care Transitions Community Paramedic (CTCP) program where specially trained Paramedics perform home visits to those who suffer chronic diseases.

Community Paramedic Programs Align with Municipal and Provincial Strategies

Provincial

CP programming aligns with Provincial Health care priorities. As we are in a time of shifting priorities it is important to note that the CP programs align well the pillars of the Patients First: Action Plan for Health Care priorities of the previous provincial government:

- provision of equitable access to the health care system by connecting individuals/families to appropriate health care services;

- informing patients of healthy lifestyle options and services to prevent and or manage chronic illness while promoting wellness;
- protection of the health care system with strategies that aim and are proven to help control health care costs through various means – such as diversion strategies, appropriate community service referrals, healthy lifestyle promotion, chronic disease prevention work and early screening and education/coaching for disease management.

Moving forward with our provinces next set of health care priorities we find that our programs also align well with the initial themes that are being released for the new direction of our provinces health care system. These programs provide strategies that assist in meeting the needs identified in the 1st interim report from Premier's Council on improving health care and ending hallway medicine titled – ***"Hallway Health Care: A system under strain" and "Bill 74 – The People's Health Care Act".*** We achieve this by providing appropriate, coordinated, effective and efficient community-based services that alleviate strain on the health care and emergency medical response systems. Our CP programs provide health care efficiencies by keeping our patients at home rather than in the hospital through prevention work, early interventions and evidence-based programs that improve health outcomes and quality of life.

CP programs are highlighted as an integral part of Ontario's Seniors Strategy. The intent of its report, titled "**Living Longer, Living Well"***,* is to provide recommendations to inform the Ministry of Health and Long-Term Care (MOHLTC) of provincial seniors' strategy. It encourages CP program utilization as part of community services for Ontario's older adults.

Municipal

The CP programs fit well with the Age Friendly strategy aligning with 5 of the 8 pillars.

1. Ensuring safety in housing through our referrals to community agencies or other programs when we find homeless individuals or those living in unsafe/hoarding/squalor situations
2. Encouraging social participation as part of clinics, home visits, phone consultations, participation in various community education programs (CPR Blitz – presentations for Parkside Centre without walls – healthy cooking classes, etc.).
3. Respect and social inclusion, our programs work with all citizens of CGS.
4. Communication and information – CPs work with various partner agencies to ensure the public is informed and patients will receive the services to address the identified unmet needs.
5. Community Support and Health Services – provide community safety education and advocacy as well as health services in the convenience of their home or building.

Coordinates well with 4 of the municipal Population Health Priorities*,* specifically:

- Families – Paramedic referrals to services, support and advocacy of older adults and caregivers;
- Mental Health – culturally appropriate referrals to various programs or case management team participation, early identification and referrals for services to local mental health services;
- Holistic Health – Health equity advocacy and referrals to vulnerable populations such as homeless and older adult's populations, healthy lifestyle education and promotion with referrals to community resources and support in accessing primary care providers;
- Age Friendly Strategy – Improved services to all ages to allow improved quality of life.

CGS Corporate Strategic Plan

Most importantly the CP programs align with municipal priorities set out in the City of Greater Sudbury's corporate strategic plan, specifically the "**Quality of Life and Place"** key pillar, by creating programs and services to improve the health and well being of our youth, families and seniors.

Community Paramedicine Program Funding

Figure 1

2017	Health Promotion	Care Transitions	Totals
LHIN Funding	$100,700	$227,800	$328,500
CGS/Partner Agency Contribution	$32,987	$147,165	$180,152
Combined Program Costs	$133,687	$374,965	$508,652

*Information as approved in Community Paramedicine Project Budget Plan to the NE LHIN

In 2014 MOHLTC provided funding for both of Sudbury's CP Programs. This funding has continued through demonstration of these programs success and now has shifted to the Northeast Local Health Integration Network (NE LHIN).

NE LHIN funding covers Community Paramedicine (CP) program staffing wages, the City of Greater Sudbury (CGS) provides in-kind supports to the program such as a vehicle, gas, medical supplies and program oversight. These in-kind donations are provided through the regular operations of Paramedic Services.

CGS Community Paramedic Programs: A Review

Care Transitions Community Paramedic

Care Transitions Community Paramedics (CTCP) specialize in treating patients with Congestive Heart Failure, Diabetes, and Chronic Obstructive Pulmonary Disease who are deemed at high risk of readmissions to hospital.

The CTCP care includes:

1. In-home chronic disease management.
2. Education/coaching to living healthfully with a chronic disease(s).
3. Medication reconciliation/review with recommendations to patient and primary care provider.

4. Emergency home visits to patients to treat exacerbations early thereby often alleviating need for hospital admission(s).
5. Bridging medications until patient can access primary care provider (such as antibiotics, steroids etc.).
6. In home blood work analysis (iSTAT) providing immediate results, this diagnostic tool assists with clinical decision making.
7. Referrals to various community services to fulfill unmet needs that put the patient at risk of a poor health outcome.

Unanticipated benefits:

1. Combat social isolation poor health outcomes with home visits.
2. Education/support/referrals and care of care givers.

How does the CTCP program work?

Scheduled and Just-in-time Home Visits – We schedule home visits spaced out as needed dependant of patient condition, need or if needed a patient can call the CTCP directly anytime from 7 am to 7 pm to request a visit to manage a worsening condition.

Education on Disease Management and as required medication reconciliation.

Medical Interventions – such as medication administration and dosage adjustments.

In Home Point of Care Testing – point of care blood analysis, 12-Lead ECG analysis and other vital signs analysis as needed with results in home.

Physician Oversight – if required, the CP may consult directly with one of the on-call program physicians or with HSN chronic disease clinics.

The CTCP program has shown to be highly cost effective to the health care system as shown in **Figure 2**. The goal when planning this program in collaboration with Health Sciences North (HSN) was to decrease health care costs per patient by 10 %. The results of the HSN led 2016 CTCP program review found a decrease in total health care costs per patient of 50%!

This was at a time when the CTCPs were seeing an average of 2.71 patients per day; currently, 2018 CTCPs are averaging 4.02 patients per day, so our assumption is that the cost recovery has been driven even higher.

Figure 2

Care Transitions Program Efficiency			
Care Transitions Community Paramedic Program (CTCP)		Health Sciences North (HSN)	
Average daily Cost of CTCP Program	**$1000***	Average cost of a standard hospital stay at HSN	**$4,974****
Average number of CTCP visits per day	4.02	Average cost per day of inpatient admission	**$1,084***
Estimated Cost per CTCP home visits	$248.76	Average cost of an emergency department visit	**$148.70 ***
		Cost per visit to Chronic Disease Management Clinic	Diabetes = **$86*** Heart Failure = **$237*** COPD = **$68***

*Source Improving Transitions: Evaluation of the Greater Sudbury Care Transitions Community Paramedic Program
**2016-17 CIHI data

CTCP Next steps

1. Maximize efficiency/Optimize Value – Establish a balance of CTCP staff where we could reach the greatest number of patients who qualify for the program without program costs exceeding the cost savings to the health care system.
2. Innovative and Appropriate Patient Care in their Home – Expansion of the CTCPs medical directives. Currently the abilities our CTCP's can offer are truly unique to this profession; no other health care professionals (except for Medical Doctors) currently can provide these services.
3. Pilot Direct Referrals from Family Health Teams – City of Lakes Family Health Team and Sudbury Nurse Practitioner led clinics are looking to send referrals directly to the CTCP program and will offer, in turn, patient care collaboration opportunities in efforts to keep these patients at home and their chronic disease, well managed.
4. Remote Patient Monitoring – Paramedics will leave Bluetooth Oxygen Saturation monitors – Blood Pressure cuffs-weight scales and Blood Glucose monitors with patients. When a vital sign is taken the result is sent to the CP program and if it is found out of ranges set by Paramedic then an alert is sent to the CP program for CP to follow-up.

In April CGS Paramedic Services will have commenced a training program to train Paramedics who can relieve in the CTCP position. These newly trained staff will provide a solution to the current staffing

challenges and will minimize program closures, covering for vacation and sick time. The CTCP program remains functioning with one CTCP staff on day shift from 7 am to 7 pm, 7 days a week, and 365 days a year.

- Hire of 4 relief CTCP staff
- Specialized Training of 4 relief CTCP staff

Health Promotion Community Paramedic (HPCP)

The CGS Community Paramedic program employs one Health Promotion Community Paramedic (HPCP); this staff member works Monday to Friday 8 am to 4 pm (closed holidays and weekends) to provide various health promotion, injury prevention, and education programs that target our communities' most vulnerable populations. The work the HPCP is responsible for includes; Older Adult Clinics, Shelters Clinics, Rapid Mobilization Table, Paramedic Referrals and Bystander hands only CPR/AED education.

1. Older Adult Clinics

   CP@Clinic is a collaborative research initiative with McMaster University, where the HPCP provides weekly four to five hour drop in clinics in subsidized older adult building common rooms. These visits allow a Paramedic to run through various health and lifestyle questions as well as health screens to assess risk factors related to chronic disease(s). The HPCP outlines the identified risk factors in discussions (Diabetes – Cardiovascular Disease – Falls Risks) **see Figure 3**. The participant decides which lifestyle changes they are ready to try to accomplish. The Paramedic checks in with the participant weekly and provides various referrals and links to community services, education on disease management and medication reconciliation.

Figure 3

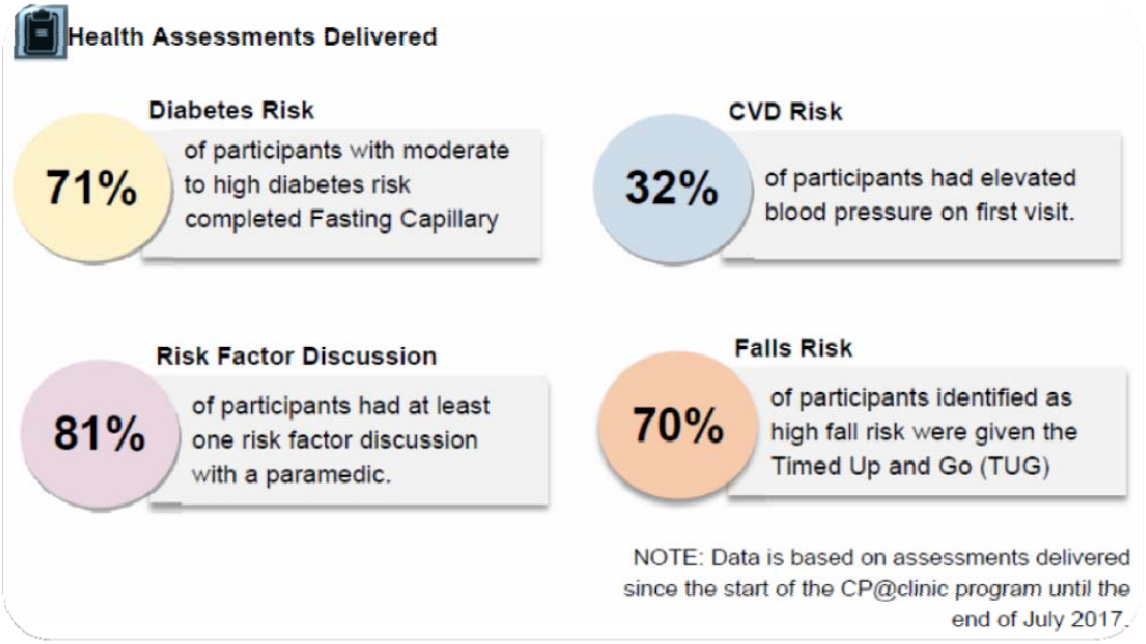


Figure 4

CP@Clinic: Research Results Highlights			
Costs		Cost Recovery	
Annual Clinic Costs per building	~ $28,539.38	911 calls to intervention building over one year	↓31%
Estimated Average Cost of 911 call*	~ $1,626**	Annual Estimated Resource Gains	~ $53,638
Estimate: For every ***one dollar invested*** into CP@Clinic program, ***there is a return of $1.88*** in resource gains to the health care system.			
2:1 Return on investment			

*(from Paramedic response →Transport to ED → ED Assessment) **Range between $499 to $2,254) Impact Report from the Research Study - A Community Paramedicine Initiative for Older Adults Living in Subsidized Housing. G. Agarwal 2016

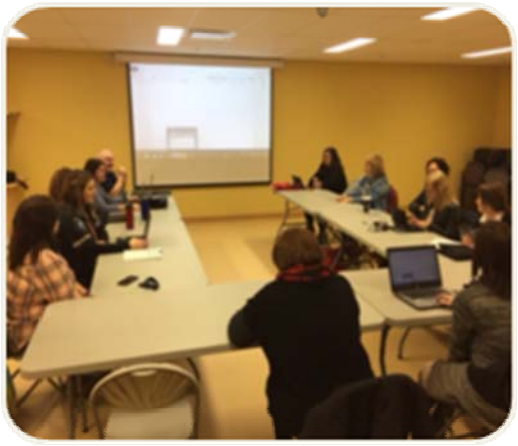
The CP@Home program has been well loved in the intervention buildings and has shown great success. The results of the 2017 research study "A Community Paramedicine Initiative for Older Adults Living in Subsidized Housing" indicate lowering of 911 calls by↓ 31% over the intervention year. All risk factor discoveries lead to Paramedic interventions such as education, coaching strategies for better health and safety, referrals to community services for unmet needs and notification of primary care practitioner, pharmacist or other relevant care agency.

These programs are currently provided in the following Greater Sudbury buildings:

- 1052 Belfry Avenue (Maintenance visits once per month or more if need established)
- 720 Bruce Avenue (Maintenance visits once per month or more if need established)
- 1960 A & B Paris Street
- 1920 Paris Street
- 17 Hanna Street (Capreol)
- 36 & 38 Coulson Court (Capreol)

2. Rapid Mobilization Table

Allows Paramedics a venue to assist those they find at elevated risk of harm for rapid wrap around care and services. Twenty-five partner agencies meet twice weekly to present and respond to individuals at elevated risk of harm. Currently, our HPCP attends once per week.



2018 Paramedic Services involvement

14 Presentations

119 Assisting Agency

Engaged in **124** working group situation discussions

Involved in **49%** of total Rapid Mobilization Table discussions

3. Shelters Clinics

HPCP provides two weekly wellness clinics to citizens from our homeless population, one at the Salvation Army Men's Shelter and the other at the Women's and Families' homeless shelter. We provide a very similar program to the CP@Clinic, though less specific to older adults. These wellness programs work to provide proper health screening but most importantly the HPCP works to restore appropriate reengagement of our homeless to the health care system.

4. Paramedic Referral

Oversight of the field Paramedics' identification/ referral of patients with signs of failing the activities of daily living, lack of social supports and safety hazards. These referrals can go to any appropriate agency, but most commonly they go directly to the NE LHIN Home and Community Care (the former Community Care Access Center (CCAC)). In 2018, Paramedics completed 282 Paramedic referrals, meaning 282 individuals Paramedics assessed as a safety concern or failing to meet the basic requirements of daily living, were linked to healthcare services to assist with these unmet needs.

5. Bystander Hands Only CPR

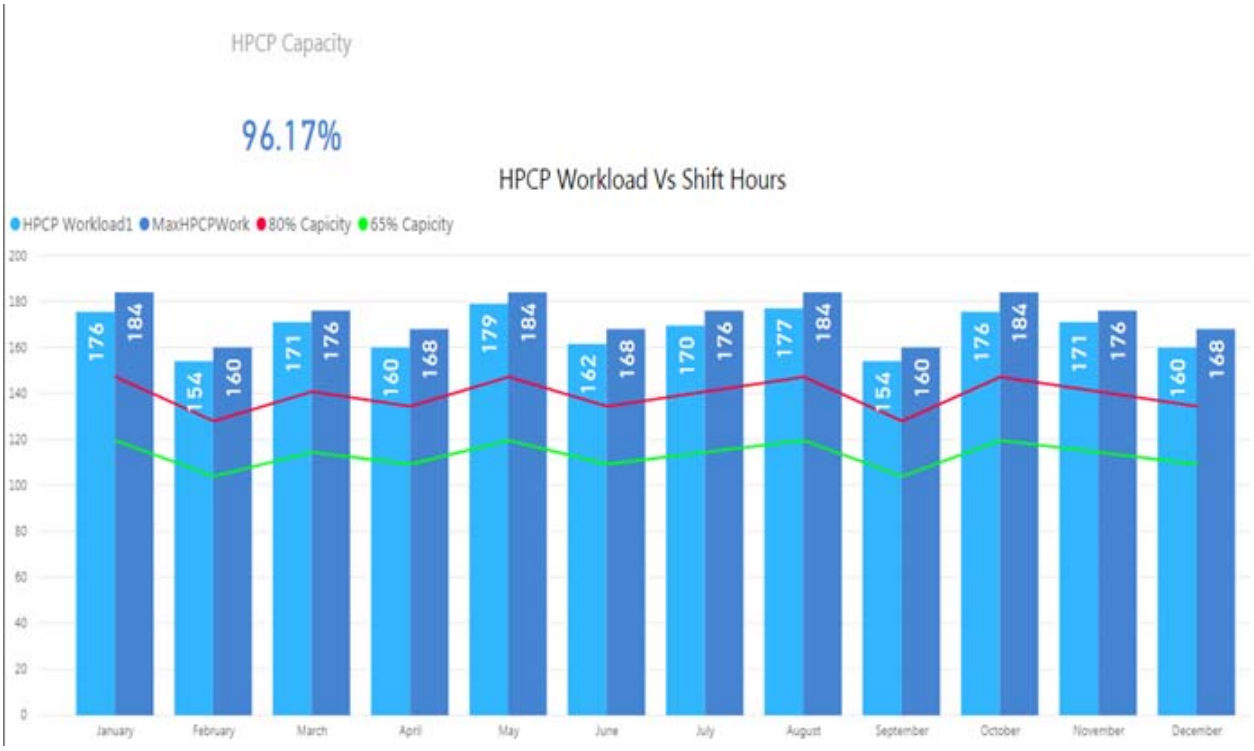
Bystander hands only CPR/AED education is free to the community, any age. Since 2014 to present (2017 excluded) HPCP and Paramedic services has educated 1537 citizens. In 2018 alone, we taught 635 citizens this important life saving skill.

The Health Promotion CP program creates situations by freeing up resource response capacity within Emergency Services (Paramedic Services-Police-Fire tiered responses) by addressing the unmet needs of our frequent users and referrals to community agencies through our HPCP initiatives.

All of the programming provided to the community is provided by one HPCP. When this Paramedic is off work for illness or annual vacation, all programs and services cease. There is no backfill to provide case management or coverage for overseeing Paramedic referrals for our vulnerable populations.

Currently there is no capacity for program expansion at current HPCP staffing levels as illustrated by **Figure 5**. At this time if we increased staffing we could accomplish more balanced community programming so other areas of Greater Sudbury could reap the benefits of this programs positive outcomes.

Figure 5



HPCP Next Steps

1. Harm Reduction Involvement for Patients Post Opioid/Illicit Drug Overdose

    - working with partner agencies to discover a method to decrease repeated overdoses with the goal to avoid deaths;
    - mandatory Rapid Mobilization Table presentation or response team of Paramedic, addictions, mental health & outreach workers to access the Paramedic and Police Services data lists of those whom have recently overdosed;

- sharing of Paramedic/Police data (in instances where there is acutely elevated risk of harm to an individual due to recent overdose) to community agencies for a response to offer services and wrap around care.

There are early reports that this bundled care model in the US is decreasing opioid overdoses and opioid related deaths by up to 50%.

2. Greater Sudbury Housing Corporation (GSHC) has indicated interest in exploring more CP@Clinic programs to be hosted within their subsidized housing buildings. This program targets all ages but specifically the older adults. GSHC staff is seeing the benefits of this program in the research currently underway involving two subsidized buildings and welcome the opportunity to place this program in more. Due to lack of resources this cannot be accommodated at this time.

3. The Salvation Army Men's shelter is slated to close May 16, 2019. It is unsure if there will be another program to step in to host the Men's shelter.

4. The HPCP Program has been approached by a Nurse Practitioner Led Clinic to host our wellness clinics in an office in their new clinic at 200 Larch Street Place; they are targeting those clients who are vulnerable, homeless and/or lacking a primary care provider.

5. Initiation of Multiple 911 Caller Home Visit Program – CP@Home sister project to Wellness Clinics – research project with McMaster University.

6. Increase Paramedics role at the Rapid Mobilization Table – increase commitment to attend all meetings weekly which would mean two days per week.

7. Work toward making our City a HEARTSafe Community – strategies to strengthen the "chain of survival" to improve our system for preventing sudden cardiac arrest (SCA) from becoming an irreversible death by:

    - CPR/AED campaign starting with mandatory participation by all CGS employees who are not currently CPR certified;
    - expansion of Public Access Defibrillator (PAD) program registration with ambulance dispatch;
    - public alerts of SCA's for response to those with CPR training through the PulsePoint application.

Figure 6

Multiple Callers: CP@Home			
Multiple Callers - 2017		Multiples callers - looking to the future	
Number of individuals who called 911 **≥ 4** times in 2017	**750** individuals	CGS Paramedic Services multiple caller trend	Our rates of multiple callers have **↑ by 24%** in 2018
Total number of 911 calls these 750 individuals initiated	4,793	Number of individuals who called 911 **≥ 3** times in 2017	569 individuals Accounting for 1707 total of 911 calls

As reported in Municipal Benchmarking Network Canada for 2017, there were 750 individuals who called an ambulance greater than four times in 2017.

The 750 individual multiple calls (shown in **Figure 6**) accounted for 4793 ambulance calls. Our multiple caller rates are growing faster than other communities, increasing by 24% in 2018 as 569 individuals called 911 ≥ three times in 2018. If even half of these individuals over the next year call for an ambulance one more time than they did in 2018, it will place a significant strain on our system. The answer is not to place more ambulances into operations but rather meet the needs of these non-urgent callers by more efficient methods.

If we can lower the unnecessary use of Paramedic responses, we will increase the availability of our staff to respond to the calls that truly require a 911 Paramedic response.

If we want to successfully lower the 911 uses by these multiple callers, our Service needs to look into our data, identify them and having a Community Paramedic go to their homes assessing for unmet needs and provide support to end this reliance on our 911 system. We plan to utilize the CP@Home program from McMaster University. It is the sister research project to our wellness clinics, where we book home visits [maximum 3 (1^{st} = 1 – 1.5 hrs; 2^{nd} & 3^{rd} = 20 minutes; each visit separated by two weeks)]. During these interactions there will be:

- home safety and needs assessment of patient;
- home and caregivers/support;
- chronic disease screening;
- medication reconciliation;
- disease management, education and coaching;
- healthy lifestyle change promotion;
- determination of social isolation or suspicion of mental health / addictions issues;
- community referrals to helpful programs that exist in the community to provide the unmet need(s) to lessen or end the dependence on emergency services.

We currently have minimal capacity to run this program due to limited resources. Our limited HPCP capacity will only see them completing a few calls per week. We will attempt to supplement this with utilization of on shift Paramedics completing home visits in our outlying areas where there is a lower call volume such as; Lively, Levack/Onaping and Capreol. However, due to fluctuating emergency call volumes this is a less than reliable framework for this program.

Emergency Department Diversion Pilot Programs

These diversion strategies allow Paramedics responding to 911 calls offer more appropriate transport destinations to our patients. These Emergency Department (ED) aversion initiatives allow transport diversions from the ED to a more specialized community health care service. Current options include; diversion of low acuity mental health patients to HSN Crisis Intervention services at 127 Cedar Street, HSN Mobile Crisis Intervention services in the home and transport to HSN Withdrawal Management Services at 336 Pine Street.

Next Steps

- Expand Diversion principles to a Primary Health Care Team model – current discussions are underway to look at developing a model to safely transport patients of low acuity to their family physician at City of Lakes Family Health Team.

- Nurse Practitioner Led Clinic at 200 Larch – to meet cultural needs targeting those who are most vulnerable in our population; typically the homeless as they generally lack a primary care provider. The clinic will have a low barrier so there will be no need for identification if not available (common with homeless population). Paramedic Services would take our low acuity walking well patients to this clinic. They will also provide dentistry, social work, pain management, mental health treatment etc.

Conclusion

In an effort to be proactive in response to our increasing call volume, we are looking at innovative ways to safely meet the needs of patients by optimizing systems already in place. These programs have no anticipated start date. CGS Paramedic Services is working toward a diversified service model. Through collaboration with other health care partners we are approaching these system problems from various perspectives. This works and is safe and improves our patients' quality of life and diminishes the need to utilize a Paramedic emergency response in non-emergency situations.

Research demonstrates Community Paramedicine Programs reduce health care costs and prevents unnecessary ED visits and hospital admissions. The CGS Community Paramedic Programs keep residents at home living healthier lives. In order to maintain and expand these services to the entire community, further investment needs to be made by increasing the Community Paramedic staff in our programs.