Assessing Patient Experiences with a Virtual Triage and Assessment Centre (VTAC): A Mixed-Method Study Using an Online Survey and Semi-Structured Interviews in Renfrew County, Ontario.

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Abstract

Background

In March 2020, the Renfrew County Virtual Triage and Assessment Centre (VTAC) was launched as a large-scale, innovative, hybrid healthcare program. VTAC aims to alleviate pressure on emergency departments by providing additional and more equitable access to family physicians and allied health professionals. This study's objective was to evaluate patients' experiences with VTAC.

Methods

In this sequential explanatory mixed-method study, we distributed 397 online surveys and conducted 10 semi-structured interviews with Renfrew County residents aged 18 and above who had utilized VTAC at least once since 2023. Survey data were analyzed through descriptive statistics, chi-squared tests, and a multivariate binary logistic regression, while semi-structured interviews were coded and analyzed using reflexive thematic analysis.

Results

Our findings demonstrate widespread satisfaction with VTAC, and a perception of receiving high-quality care. This was irrespective of demographic characteristics, health status, or appointment modality. In our interviews, four main themes emerged: "Healthcare in Renfrew County", "Accessing VTAC", "VTAC Clinical Care", and "Improving VTAC". These themes underscore major difficulties residents encounter in accessing healthcare in Renfrew County and illustrate that services from VTAC align with a genuine population-level need, offering a valuable contribution to addressing some of these challenges.

Conclusion

Our study highlights that Renfrew County is grappling with a crisis of access to healthcare, and that VTAC fills a crucial gap, primarily by providing timely access to a family doctor. The findings provide evidence of patient acceptability and satisfaction with VTAC, potentially guiding the design of future healthcare programs.

Background

In Canada, primary care providers (mainly family physicians supplemented by nurse practitioners) act as the initial point of access to the healthcare system, and are tasked with addressing the majority of patients' healthcare needs throughout their lives, ranging from prevention to diagnosis, management, and treatment (1, 2). However, the Canadian primary care system faces numerous challenges in regard to ensuring equitable access to healthcare services for all citizens, including an aging population with

increasing health needs, growing administrative burdens, and a decline in medical graduates opting for primary care specialization (3–5). These challenges place significant strain on primary care providers, impeding their ability to provide timely access to care (6). Recent results from a nationwide survey indicate that 6.5 million residents lack a primary care provider, classified as “unattached” or “non-enrolled” (7). Furthermore, according to the Canadian Medical Association (2024), one-third of Canadians considered “attached” report difficulties in securing an appointment with their primary care provider (8). This access to care crisis has become one of the most pressing concerns facing Canadian healthcare (9), and is particularly severe in rural regions, with only 8% of physicians practicing there, despite 18% of Canadians residing in these areas (10). Access to care challenges in rural regions also stems from large geographical areas, lack of healthcare infrastructure, and frequent staff turnover (11–15). These factors leave more residents vulnerable, ultimately resulting in worse patient health outcomes, including higher mortality rates (16, 17).

In Renfrew County, Ontario, the emergence of the COVID-19 pandemic, combined with the previously mentioned challenges in rural healthcare, prompted the rapid establishment of the Virtual Triage and Assessment Centre (VTAC) in March 2020. VTAC, a 24/7 centralized healthcare service, emerged from an unprecedented collaboration between family doctors, community paramedics, local public health, hospitals, primary care teams, and a broad spectrum of existing local healthcare services and allied health professionals. Initially conceptualized as a response to COVID-19, VTAC has always included assessment and care from family doctors. The program's directive is clear: prioritize contacting your family physician first for any health concerns. For residents with an urgent health concern who do not have a family doctor or cannot access their regular primary care provider, VTAC is available as an alternative to an emergency department and as a safety net to prevent people from suffering at home in silence without access to healthcare. The program provides multiple layers of care, featuring three main visit modalities: virtual assessments conducted by family doctors, hybrid assessments that involve a community paramedic in-person with the patient and a physician real time by virtual means, and in-person assessments conducted by community paramedics either at the patient's home or at a Clinical Assessment Centre (18).

Since its establishment, VTAC has played a significant role in delivering care in Renfrew County. As of the end of January 2024, VTAC has completed approximately 130,000 assessments for over 44,000 unique patients, in addition to more than 70,000 COVID-19 tests completed during the pandemic (19). Throughout 2023, specifically, more than 70% of appointments were with unattached residents. Since June 2023, the majority of VTAC appointments (86%) were virtual assessments with a family doctor. Hybrid assessments involving both a paramedic and a physician accounted for 6% of all appointments, and an additional 7% of encounters were in-person, paramedic-only assessments. Last, a small number of encounters were with paramedics by virtual means and in-person appointments with a family doctor (19).

VTAC, a living and evolving healthcare program and innovative method of care delivery, warrants close attention to improve and understand its impact. Aligned with the well-recognized quintuple aim

framework (20–22), VTAC has demonstrated notable clinical and economic benefits, as supported by comprehensive evaluations (23, 24). Furthermore, VTAC providers have reported high levels of satisfaction, according to a recent assessment of their experiences with the program (25). However, no thorough evaluation has previously been conducted to assess patient experiences with the program. Therefore, this study aimed to investigate the experiences of patients with VTAC and identify factors that contribute to patient satisfaction.

Methods

Study Setting

VTAC operates in Renfrew County, the largest county in the province of Ontario. Located along the western bank of the Ottawa River, the county is home to approximately 107,000 residents and spans a large geographical area of approximately 7,600 square kilometers (26). The large territory poses a unique challenge in the county, affecting access to care differently across the urban-rural continuum. Within the county, residents in more rural areas may need to travel up to twenty times farther to reach a provider compared to those in semi-urban communities (11). Furthermore, the county boasts some of the highest rates of chronic physical and mental illnesses in the province, compounded by above-average unemployment rates and low socioeconomic status (26). The difficult healthcare landscape is exacerbated by a notable shortage of family physicians, leading to one of the highest rates of unattachment in Ontario, which is estimated to be between 20 and 25% (23). Moreover, Renfrew County uniquely lacks any walk-in clinics, leaving residents without a family physician heavily reliant on the region's 5 emergency departments for medical care (18).

Study Design

This mixed methods study used a sequential explanatory design to collect data on patients' experiences with VTAC. We administered an anonymous online survey and conducted in-depth semi-structured interviews with participants selected from the pool of survey respondents. Throughout this process, we ensured compliance with the Standards for Reporting Qualitative Research guidelines (27). This study received approval from the Institut du Savoir Montfort Research Ethics Board.

Study Participants

Participants had to meet the following inclusion criteria: 1) had attended an appointment with VTAC after July 2023, 2) were aged 18 or older, 3) had a valid health card number, and 4) consented to be contacted for further participation during their most recent visit to VTAC. Recruitment for the study took place from July 2023 to January 2024. We invited participants to a one-on-one, semi-structured interview through the online survey and all participant communications. Individuals were then identified and selected from these invitations to participate in our interviews.

Patient Partners

To ensure that our research aligned with the realities of Renfrew County, we recruited three patient partners (DBP, MH, and KM) who reside in different communities within the county and who have vast personal experiences as patients with VTAC. These partners brought diverse backgrounds and experiences to our study and were actively involved in every phase, from its initial design to the analysis of findings and manuscript editing.

Online Surveys

Prior to conducting the interviews, we administered a 37-question online survey hosted on Microsoft Forms (28). We sent survey invitations to potential respondents through VTAC's dedicated email communication platform, followed by a reminder to enhance participation. A power calculation, considering Renfrew County's population of 107,000, determined that a sample size of 385 participants was necessary to achieve a 5% margin of error with a 95% confidence level (29). The survey aimed to delve into residents' experiences with VTAC, focusing on aspects such as satisfaction, quality of care, trust, demographics, and health characteristics (Appendix A). We incorporated questions derived from previous studies (30–35), and after consulting with patient partners, we adapted a digital literacy questionnaire. This adaptation integrated two questions from Nelson et al.'s tool to create a digital literacy scale ranging from 2 to 10 (Supplementary Table 7) (36).

Semi-Structured Interviews

Following our sequential explanatory design, we developed a preliminary set of interview questions based on an initial analysis of survey data (Appendix B). We aimed to achieve thematic saturation for VTAC's primary visit modality, which comprises virtual appointments with physicians (representing more than 85% of total appointments since June 2023). We included patient perspectives on other visit modalities such as paramedic visits, even though these comments did not reach thematic saturation. To refine and ensure the clarity of these questions, we conducted pilot interviews with the patient partners. The data from these interviews were included in the analysis (19). Then, we randomly selected patients for additional study interviews. Concurrent analysis revealed that we had neared or achieved thematic saturation across the data themes after eight interviews. To ensure comprehensive demographic representation and thematic saturation of the data, we conducted two additional interviews, specifically targeting participants under 35 years of age (37). In total, we conducted 10 interviews with VTAC patients. The interviews were conducted by a trained health science researcher (AS), who works for VTAC. To maintain transparency and mitigate potential biases, interview questions were carefully formulated to avoid leading or suggestive language. The interviews lasted between 25 and 35 minutes. As a gesture of appreciation, the interviewees received a $25 gift card. Prior to the interviews, each participant provided oral consent.

Statistical Analysis - Quantitative Data

We analyzed survey results using descriptive statistics (frequency distributions, medians, and interquartile ranges), and conducted chi-square tests for survey questions related to satisfaction. Finally, we built a binary logistic regression model to explore the relationships between demographic and health

characteristics, clinical outcomes, and overall satisfaction with VTAC. In the logistic regression, the outcome variable was categorized as either "Satisfied" (if the responses were either "Satisfied" or "Very satisfied") or "Not Satisfied" (for "Neutral," "Dissatisfied," or Very Dissatisfied" responses). Covariates included age, gender, education level, attachment status, digital literacy, self-perceived health, and medical issue resolution (Supplementary Tables 5 and 6). Data with missing values were omitted from the analysis under the assumption that they were missing at random. The analysis was performed using R software, version 4.2.3 (38).

Statistical Analysis - Qualitative Data

Two members of the research team, AS and CP, conducted the analysis of interview transcripts through reflexive thematic analysis (39, 40). The Interviews were recorded and transcribed using the auto-transcription feature in Microsoft Teams (41), and then checked for verbatim accuracy. The two researchers individually examined the transcripts, and then collaboratively discussed the data to compare codes and identify initial themes and subthemes. After reaching a common conceptualization of the content, preliminary codes were arranged into a coding framework and inserted into Taguette (42), a free, open-source qualitative-data-analysis software, along with the interview transcripts. All 10 interview transcripts were consensus-coded by AS and CP. The coding framework was adjusted throughout based on shared meaning and coding frequency within the transcripts. Following the coding, AS and CP met to review all quotes to ensure consistency and to conduct thematic analysis to identify and define themes and subthemes in the data.

Results

Survey Statistics, Demographic and Patient Health Characteristics

We distributed a total of 3,026 surveys to eligible participants, resulting in 383 responses, yielding a response rate of approximately 13%. The majority of respondents were women (69.9%) aged 55 years and older (58.2%). Table 1 summarizes the demographic and health characteristics of the respondents. Interestingly, fewer than one in five (19%) reported being attached to an accessible family physician, while the majority were either unattached (58%) or enrolled with a provider who is not easily accessible (23%). The breakdown of visit types shows that 70% of survey respondents had experienced a virtual physician appointment, 13% a hybrid appointment, and 15% an in-person appointment.

Table 1
Sociodemographic Characteristics of the Survey Respondents.

Demographic Information	n (%)
Age	
18–24	9 (2.4)
25–34	43 (11.4)
35–44	53 (14.1)
45–54	52 (13.8)
55–64	105 (27.9)
65–74	88 (23.4)
75–84	24 (6.4)
85+	2 (0.5)
Prefer not to answer	0 (0.0)
Total (missing)	376 (7)
Gender	
Woman	262 (69.9)
Man	104 (27.7)
Non-binary	4 (1.1)
Other	5 (1.3)
Prefer not to answer	0 (0.0)
Total (missing)	375 (8)
Race/Ethnicity	
Asian (including East, Southeast, and South Asian)	3 (0.8)
Indo-Carribean or Carribean Black	0 (0.0)
Middle Eastern/North African	0 (0.0)
Black - Sub-Saharan African, Northern American or Carribean	2 (0.5)
Latin American/Hispanic	0 (0.0)
Indigenous (including First Nations, Inuk/Inuit, and Métis	16 (4.3)
White - European or North American	341 (90.9)

Demographic Information	n (%)
Age	
Mixed Heritage	5 (1.3)
Prefer not to answer	3 (0.8)
Other	5 (1.3)
Total (missing)	375 (8)
Attachment Status	
I have a family physician	71 (18.6)
I have a family physician, but they are not easily accessible to me	89 (23.4)
I do not have a family physician but am in the process of finding one	96 (25.2)
I do not have a family physician	125 (32.8)
Total (missing)	381 (2)
Education Level	
Less than high school	11 (2.9)
High school diploma	70 (18.6)
College or technical diploma	195 (51.9)
University degree	92 (24.5)
Prefer not to answer	8 (2.1)
Total (missing)	376 (7)
Yearly Income	
Less than $20,000	33 (8.8)
$20,000 - $40,000	72 (19.2)
$40,000 - $60,000	67 (17.9)
$60,000 - $80,000	68 (18.1)
Greater than $80,000	72 (19.2)
Prefer not to answer	63 (16.8)
Total (missing)	375 (8)
Preferred Language	
English	374 (99.5)

Demographic Information	n (%)
Age	
French	2 (0.5)
Other	0 (0.0)
Total (missing)	376 (5)
Current Living Arrangement	
I live with a partner, spouse, or family member(s)	302 (80.7)
I live with friend(s)	7 (1.9)
I live alone	61 (16.3)
Other	4 (1.1)
Total (missing)	374 (9)
Digital Literacy Scale	
2 to 4	32 (8.5)
5 to 7	65 (17.3)
8 to 10	262 (69.7)
Overall Health	
Very poor	7 (1.9)
Poor	27 (7.2)
Fair	92 (24.5)
Good	188 (50.0)
Very good	61 (16.2)
Prefer not to answer	1 (0.3)
Total (missing)	376 (7)
Presence of Chronic Conditions	
Yes	243 (64.6)
No	126 (33.5)
Prefer not to answer	7 (1.9)
Total (missing)	376 (7)
Current Mobility	

Demographic Information	n (%)
Age	
I have no problems walking about	241 (64.1)
I have slight problems walking about	60 (16.0)
I have moderate problems walking about	54 (14.4)
I have severe problems walking about	14 (3.7)
I am unable to walk about	3 (0.8)
Prefer not to answer	3 (0.8)
Total (missing)	375 (8)
Distance from Nearest Hospital	
Less than 5 kilometers	123 (32.7)
5 to 10 kilometers	85 (22.6)
10 to 20 kilometers	89 (23.7)
More than 20 kilometers	75 (19.9)
I am not sure/not applicable	4 (1.1)
Total (missing)	376 (7)

Overall Satisfaction

Most respondents (86%) expressed being satisfied or very satisfied with their overall VTAC experiences. Satisfaction levels were high across modalities: 89% for virtual appointments, 92% for hybrid appointments, and 98% for in-person paramedic appointments (Fig. 1).

Overall VTAC Experiences

Participants gave high scores to questions pertaining to various aspects of their overall experience with VTAC, including the booking process, visit outcomes, and interactions with receptionist staff. Specifically, 83% of respondents agreed or strongly agreed that they knew the next step in their care, while 80% felt that their health concern was effectively resolved. Additionally, 76% indicated that they would have sought care at the nearest emergency department if VTAC was not available (Fig. 2).

Virtual Physician Experiences

Survey respondents who reported having a virtual encounter with a VTAC physician expressed favorable views toward the physician, the quality of care, and virtual care (Fig. 3). The majority (96%) of appointments with physicians were conducted via phone (Supplementary Table 2). Over 70% of the

attached respondents mentioned that they had tried contacting their physician before resorting to VTAC. In regard to care quality, 65% indicated that the quality of virtual care was either comparable or superior to that of in-person care, and 79% mentioned that their healthcare needs were satisfactorily met through virtual care. The lowest score was observed for whether residents were able to book an appointment at their preferred time, with only 55% agreeing or strongly agreeing (Fig. 3).

Hybrid Experiences

Survey respondents reported very positive experiences with hybrid appointment modalities, with 92% agreeing or strongly agreeing that the hybrid model was an effective way to administer healthcare. Additionally, over 85% expressed agreement for questions related to the added value of having an in-person paramedic and a virtual physician simultaneously, as well as the staff's collaboration (Fig. 4).

Paramedic Experiences

The highest agreement was observed for the questions pertaining to in-person community paramedic appointments (90% agreement; Fig. 5). In addition, while more than 60% of respondents seen by a community paramedic mentioned that they would have sought a physician’s care without the paramedic intervention, less than 40% were advised to visit a physician, indicating that community paramedics effectively addressed a significant portion of healthcare needs without the need for further physician consultation (Supplementary Table 4).

Results of Chi-Square Test

Visit-related factors emerged as more influential determinants of patient satisfaction with VTAC than demographic or health characteristics. Notably, while individuals with chronic conditions and male participants tended to exhibit lower satisfaction levels, these differences were not statistically significant. Factors such as age, education, economic status, and digital literacy demonstrated minimal, non-significant associations (Supplementary Table 8). Conversely, nearly all survey questions regarding care experience exhibited significant associations with satisfaction (Supplementary Table 9). In terms of satisfaction with virtual physicians, respondents who reported trust in VTAC, who perceived that their health issue was addressed, or who reported high-quality care through VTAC, were significantly more inclined to report satisfaction ($p < 0.001$) (Supplementary Tables 9 and 10).

Binary Logistic Regression Results

Consistent with the chi-square findings, the only variable that significantly contributed to overall patient satisfaction was issue resolution. Specifically, participants who concurred that their medical issue was resolved following the VTAC appointment were nearly 10 times more likely to report satisfaction with VTAC in the adjusted model (odds ratio: 9.81, CI: 3.85–26.26, $p < 0.001$). None of the demographic variables displayed a significant association with satisfaction, in either the adjusted or unadjusted models (Supplementary Tables 5 and 6).

Semi-Structured Interviews

Demographic characteristics of the interview participants are summarized in Table 2. Our qualitative analysis revealed the presence of four primary themes within the interview codes: “Healthcare in Renfrew County”, “Accessing VTAC”, “VTAC Clinical Care” and “Improving VTAC”. Within these primary themes, we further identified specific subthemes to aid with the analysis (Appendix C). In the following section, we expand upon these themes, supplementing our explanations with quotations extracted from the semi-structured interviews.

Table 2
Sociodemographic Characteristics of the Interview Participants.

Demographic Information	n
Age	
18–34	3
35–54	2
55–74	4
75 or older	1
Gender	
Woman	6
Man	4
Attachment Status	
Unattached	8
Attached	2
Encounter Type	
Physician virtual	9
Paramedic in-person	2

Healthcare in Renfrew County

Participants in our study identified significant access to care challenges in Renfrew County, typical of rural healthcare, including provider shortages, long travel distances, and excessive reliance on emergency departments, exacerbated by the lack of walk-in clinics: “*if there was no VTAC… Yeah, I'd be constantly at the emergency, and I believe the amount of people that use VTAC surely aids in the lower number of people going to emergency…*” (P8). Participants residing in regions further from urban centres reported that travel burdens severely impacted their ability to access care: “*If there was a walk-in clinic it in the county, it could be 90 minutes from my house, […] I think a lot of the time I would just not access it…*” (P6).

Interestingly, access challenges were reported by both the unattached and the attached participants in this study. Notably, the unattached complained about having to rely excessively on emergency departments to access routine care, such as medication renewals: "*…waiting rooms are long waits and a lot of people either avoid that because they don't want to wait six or eight or however many hours.*" (P3). Meanwhile, interviewees attached to a primary care provider reported that access remained a significant hurdle, citing their doctors as far away, overburdened and inaccessible: "*… Most of the time you phone when you need advice or an appointment and you can't get an appointment for maybe two weeks, so that's not acceptable.*" (P2). The attached participants consistently identified travel distance as a major barrier to accessing traditional primary care: "*…The other reason I'd use VTAC is if I need them to look at something. I know my family doctor can't do that and I can't drive to her office cause it's five hours away, so I would use VTAC for that.*" (P5). Despite these challenges, residents recognized the importance of having a family physician who is familiar with their medical history, emphasizing the significance of care continuity: "*I like it that I have a doctor who knows me and for managing my thyroid over the years, or managing my like family building, conception, pregnancy, stuff like I can do all that with her…*" (P6).

Accessing VTAC

Participants reported various motivations for utilizing VTAC. Many compared VTAC to a virtual walk-in clinic and utilized the program's services for non-urgent matters, including seeking medical advice, acute episodic care, and assistance with managing chronic conditions, including medication review and prescription renewals: "*I have like six prescriptions that I get renewed (through VTAC). You know, like within, you know, 36 hours I had prescriptions delivered to my door by the pharmacy.*" (P8).

Facilitators of access to VTAC among study participants included the ease of accessing virtual care, VTAC's fast same-day appointments, and its seamless integration with local healthcare networks. These factors ultimately led to significant reductions in time, cost, and stress for participants: "*… if there was no VTAC, you know, I'd be going to emergency and you know that's a, you know, $35 cab ride there and back each time…*" (P8). On the other hand, the most significant barrier to access, as pointed out by the interviewees, was related to VTAC's appointment scheduling system. This system often required residents to call early in the morning or be instructed to call back the following day, creating a significant hurdle for timely access: "*Once we called in and they didn't have any same day appointments left. So, they said that we needed to call back the next day, closer to 9:00 AM, and we would be able to get an appointment the next day*" (P6). Additional barriers included challenges associated with access to care for residents lacking adequate levels of digital or healthcare literacy: "*There's a lot of people who can't use virtual… Whether they have internet or don't have internet or don't have computers*" (P3).

VTAC Clinical Care

Consistently and across all interviews, participants voiced their satisfaction with VTAC, highlighting its importance within the region: "*…We moved to this area (Renfrew County) for a bunch of reasons, and one of the things we were worried about was healthcare, and whether we would be able to access healthcare […] But VTAC… It feels like I have better access to healthcare, living way out here than I did living in the*

city..." (P6). The interviewees expressed high satisfaction with virtual care, acknowledging its limitations in certain situations, such as physical examinations. However, many reported that the care they received was comparable to in-person visits and significantly improved access to care: "*I think virtual is even better in a way. Like it's definitely not worse. […] You know, I'm not waiting in a room doing nothing, or nowadays, being exposed to COVID or something like that. I can just do my own thing, and if they're 15 minutes later, or half an hour late, it doesn't matter because they just call me when they call me, and I carry on with my life. The actual care itself has been very comprehensive and just as effective as being in person.*" (P6). Many also emphasized the quality of virtual care provided through VTAC, which leverages a wide range of digital technologies not commonly available in a primary care setting. These include digital monitoring tools such as stethoscopes, high-resolution webcams, and the ability to upload photos: "*… I had a new mole on my body, […] and so I didn't call my family doctor because she would want to see it and I can't send her a picture of it. But VTAC is set up to receive a photograph."* (P6). While participants widely appreciated the quality of care and virtual services provided by VTAC, they underscored the importance of achieving a balance between virtual and in-person consultations: "*They need to see you and assess you at least once a year. I would think that would be my personal perspective and whether it be VTAC or family doctor. I think a personal touch occasionally would be an asset if the person can get there at all."* (P2).

VTAC staff were consistently recognized for the quality of care provided, as well as for their professionalism and compassionate approach: "*So, I called the practitioner, and she was very emotionally supportive, not just textbook-wise. […] Like reflective listening, almost, rather than just pushing me along.*" (P9). Participants reported multiple instances of physicians maintaining high standards in care delivery, including conducting follow-ups to address errors or for additional testing: "*… They set up an appointment for follow up. And the doctor followed up […]to say she had sort of double thought the prescription that she was giving me and sent me for more blood work and a CT scan.*" (P7). Participants also noted that VTAC physicians used a humane, patient-centered approach: "*They're all very, um, patient oriented. That's like their first, um important thing is to help you with your problem...*" (P4). At times, challenges arose when VTAC physicians from outside Renfrew County had limited awareness of local resources and residents' locations, impacting care coordination and efficiency: "*The physician was not in Renfrew County, so didn't know where I lived or what was near to me. […] So, it was a bit like solving a puzzle with somebody who didn't know the local resources...*" (P6).

Participants described positive interactions with community paramedics and medical receptionists. Two participants mentioned having appointments with community paramedics and described the care provided as high-quality and patient-oriented: "*… whenever my husband was the main patient when they would visit… […] I get bronchitis at times, and I'd say, would you mind listening to my chest? No problem. You know, they check me out and let me check your blood pressure while I'm at it. And they gave me my flu shot as well as his. So, because they knew I couldn't leave him unless I had someone here. So just excellent…*" (P2). The same was true for medical receptionists, with patients expressing trust in their ability to make triage decisions: "*The person on the phone is very knowledgeable to say whether it was*

something that would fall under (VTAC) [...] or if we should be going to the emergency department, and then an appointment was scheduled." (P3).

Improving VTAC

Participants identified two main areas for improving VTAC: expanding in-person appointment options and raising awareness of VTAC services. Despite having multiple in-person Clinical Assessment Centres led by community paramedics across the county, participants noted unclear and limited access to in-person consultations with VTAC, describing the process of securing appointments as opaque: "*I'm learning more now of some of the other options that are available, like the clinics and the being seen in person. […] like I wasn't even aware of it when I made the calls more recently. Like that option wasn't given to me…*" (P3). Some participants were confused about VTAC services, mistaking it for a COVID-19 clinic or an alternative to emergency 911. Similarly, some interviewees were also unaware of the full range of services VTAC offers, and were unsure about logistical details such as wait times, visit options and hours of operation: "*I did not know how long to expect to wait for an appointment, whether it would be a live appointment or a phone appointment...* (P7)".

Discussion

This mixed-method study aimed to assess the experiences of Renfrew County residents with VTAC, and to identify factors that influence their satisfaction with the program. Survey data analysis revealed that participants expressed overwhelmingly high satisfaction with all visit modalities (virtual physician, hybrid, in-person paramedic). Importantly, visit-related factors, such as issue resolution, played a significantly greater role in determining patient satisfaction than demographic factors such as age, gender, economic status or digital literacy. Qualitative interviews revealed four key themes ("Healthcare in Renfrew County", "Accessing VTAC", "VTAC Clinical Care" and "Improving VTAC"), underscoring a widespread perceived access-to-care crisis, affecting both unattached residents and some attached residents in Renfrew County. The findings also suggest that residents value VTAC's accessibility, care quality, and effectiveness in meeting regional healthcare needs, while also identifying areas for improvement.

VTAC also includes an attachment arm, known as the Integrated Virtual Care, which enrolls patients to a named family physician predominantly working off-site. These IVC family physicians are embedded within existing local family health teams. Patients receive comprehensive, team-based primary care, through a blend of in-person, at-home, and virtual care options tailored to their individual needs and preferences. Virtual care options include secure messaging, telephone and video encounters from the patient's home, as well as enhanced telemedicine options at the local clinic. Enhanced telemedicine involves an allied health professional being present in-person with the patient, providing real-time assistance to the physician delivering virtual care. Partnership with the existing community paramedicine program enables a range of at-home care options for vulnerable, home-bound patients. Furthermore, other physicians, nurse practitioners, and allied health professionals within each local group offer additional in-clinic care options for IVC patients. The named IVC family physician retains overall

responsibility for their patients' primary care (30, 43). Although the IVC is a part of VTAC, it was not the focus of this study, as it is currently undergoing its own independent evaluation.

Rural healthcare challenges are well documented in Ontario (12, 15, 16). During our study, we identified a significant access-to-care crisis within Renfrew County. On the one hand, the county has a significant number of unattached residents (23), and the region lacks the required resources and infrastructure, such as walk-in clinics, to address the acute and episodic healthcare needs of this unattached population. On the other hand, residents with a family doctor also encounter significant barriers to accessing care. Their providers may be distant (often outside the county) and overburdened, especially in more rural regions. This indicates that the access crisis extends to many residents who are formally attached to a provider.

Previous work suggests that longer travel distance contributes to "distance decay", leading to worse health outcomes (14). In our study, only one-third of survey respondents reported living within 5 kilometers of the nearest hospital, with distance also being a recurring complaint during study interviews. Our findings show, however, that virtual care represents an excellent tool in response to the aforementioned challenge, especially considering Renfrew County's widespread broadband internet access (11). This context, coupled with the high levels of satisfaction reported in our surveys and interviews, suggests that VTAC's mode of care delivery is a well-suited complement to the existing care delivery options in Renfrew County.

Concerns frequently arise regarding virtual care's impact on health equity, stemming from the notion that residents with lower levels of digital or healthcare literacy may struggle to adapt to new technologies, potentially hindering their access (44). Our study challenges these perceived apprehensions. On rare occasions, interviewees mentioned the possibility that digital, or healthcare literacy could pose challenges. However, survey data reveal that satisfaction with VTAC is not strongly linked to demographic factors such as age or digital literacy. Rather, satisfaction was more closely associated with visit-related factors, including the quality of care and the successful resolution of health concerns. These findings are consistent with previous research on patient experiences with virtual care (33, 45). Furthermore, a recent Canadian systematic review of mixed-methods studies by Ilali et al. suggests that older adults adapt well to telemedicine in a primary care setting (46).

Recommendations

Since its establishment in 2020, VTAC has made significant progress, but there is still room for improvement. Patient feedback suggests a desire for VTAC to expand its in-person healthcare options. This expansion could build on the proven effectiveness and cost-efficiency of paramedic-led home visits and assessment centres (47, 48), or establish new partnerships with other providers such as community pharmacists. Moreover, VTAC's triaging system could be made more transparent and flexible by offering patients options for consultation modes—phone, video, or in-person—since currently, they have little to no involvement in this decision-making process. Although VTAC has undertaken significant campaigns to raise awareness (23), there is a need to continue and strengthen these efforts, particularly by clarifying

VTAC's scope of practice, as many residents still perceive VTAC as solely an alternative to a 911 line or a COVID-19 clinic, despite its broader capabilities. Throughout the interviews, many residents raised issues with VTAC's booking system, indicating a need for improvement. Revamping the booking system, perhaps by incorporating an online scheduling tool or reevaluating the policy on same-day appointments, could improve the patient experience.

Limitations

Our patient-centered design, involving partners from the community, coupled with the utilization of a mixed-methods approach employing multiple methods, ensures that the study aligns with community needs and provides a fuller understanding of patient experiences with VTAC. However, the findings from the survey should be approached with caution due to inherent biases common in online surveys (49), a low response rate of 13%, and a participant demographic that does not fully represent the entire VTAC population. For example, survey respondents were older (58% over 55 years old vs. 54% in the VTAC population), predominantly female (70% vs. 63% in the VTAC population), and less likely to be unattached to a provider (58% unattached vs. 73% in the VTAC population) (19). Consequently, some communities and patient groups were not well represented in our study sample. Moreover, the interview participants consisted only of residents who engaged in virtual appointments with physicians and in-person appointments with community paramedics. While these two modalities account for the majority (92%) of VTAC appointments (19), we did not interview participants who had experienced hybrid appointments or other rare visit types, suggesting that our study did not cover all appointment modalities. Finally, VTAC operates within Renfrew County, and our results may not directly apply to other primary care programs across Canada or internationally.

Conclusion

This study aimed to explore the experiences of Renfrew County residents with VTAC, an innovative hybrid model of care delivery. Our findings suggest that VTAC is a well-adapted, effective, and highly regarded service that patients see as part of the solution to a crisis in access to healthcare in this rural part of Ontario. Throughout the surveys and interviews, participants reported high levels of satisfaction with all visit modalities. Time and again, patients outlined how VTAC enabled them to access quality healthcare that addressed their concerns in a timely manner. Combined with previous work by our group assessing other dimensions of the quintuple aim framework, this study suggests that VTAC can serve as a valuable blueprint for other regions facing similar challenges with a lack of attachment to primary care. Whilst ongoing assessment of the care delivered by VTAC will of course be important, there is little doubt about the overall experience of patients who use it. This study shows that patients' experience with VTAC is not limited to being overwhelmingly positive but extends beyond that, to the point that VTAC has become an essential, trusted provider of healthcare in the region. "*I just want to make sure everyone knows that it's an excellent thing……and I'm glad to be in an area that has it.*" (P10).

Declarations

Ethics Approval and Consent to Participate

All research conducted in this study adhered to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2). Formal ethical approval for the study was obtained from the Montfort Hospital Research Ethics Board (REB). Participants provided consent prior to completing the survey or participating in the semi-structured interviews.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets generated and/or analyzed during the current study are not publicly available due to the qualitative nature of the research and the necessity of safeguarding patient confidentiality, but de-identified data are available from the corresponding author upon reasonable request.

Competing Interests

Jonathan Fitzsimon serves as the medical lead at the Renfrew County Virtual Triage and Assessment Centre (VTAC). Antoine St-Amant and Cayden Peixoto hold salaried positions at the Institut du Savoir Montfort, partially funded by allocations for VTAC evaluation. Patient partners (DBP, KM, and MH) received financial compensation from VTAC for their involvement in the project. There are no other conflicts of interest to declare.

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Author Contributions

All authors have met the necessary requirements to be listed as authors on this manuscript. A.S. made significant contributions to the study conception, design, acquisition, analysis, interpretation, and manuscript preparation. C.P. contributed significantly to the study design, analysis, interpretation, and manuscript preparation. Patient partners (D.B.P., K.M., and M.H.) made significant contributions to the study conception, design, analysis, interpretation, and manuscript preparation. J.F. contributed significantly to the study conception, design, interpretation, and manuscript preparation. All authors critically revised the manuscript, approved the final version for publication, and agreed to be accountable for all aspects of the work.

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Figures

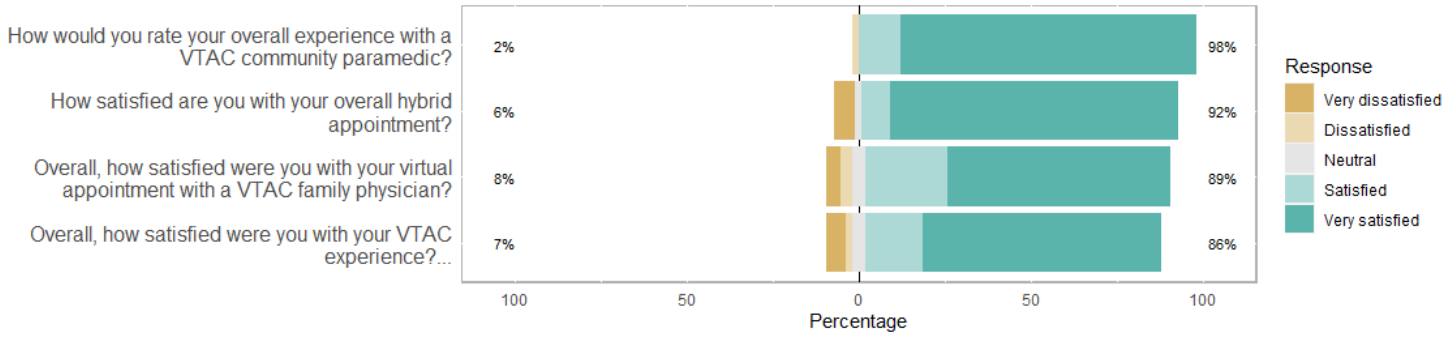

Figure 1

Satisfaction with VTAC's Main Visit Modalities and Overall Satisfaction.

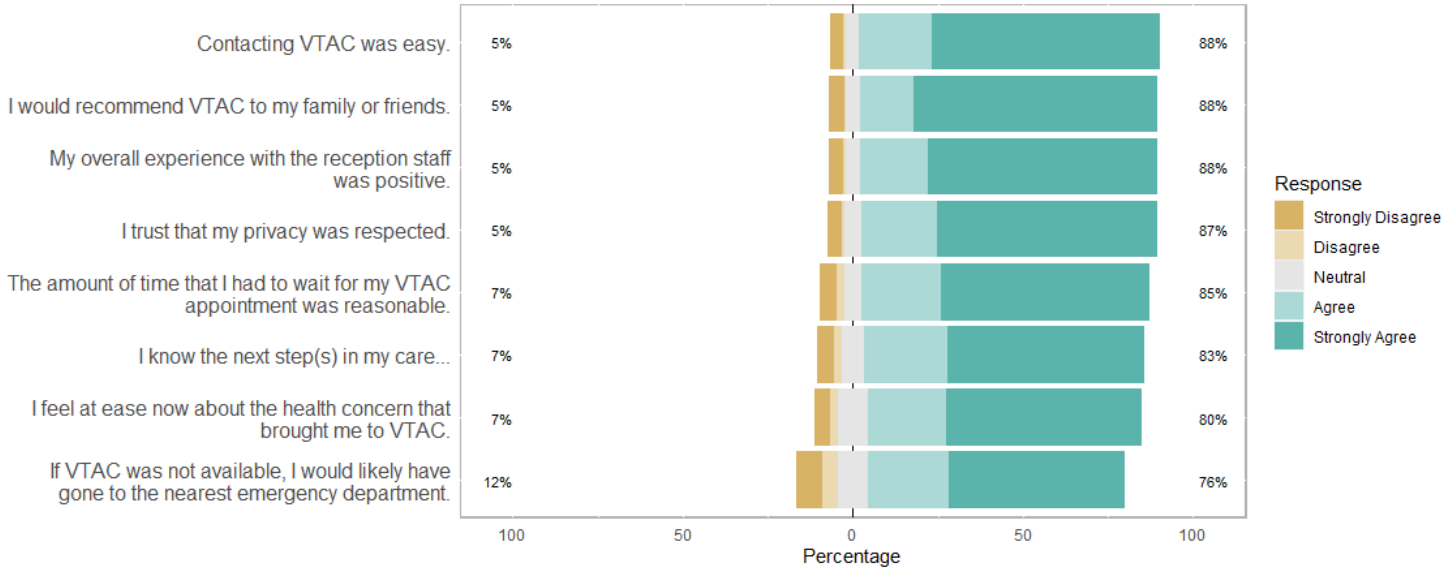

Figure 2

Likert-Scale Survey Responses: Overall Patient Experiences.

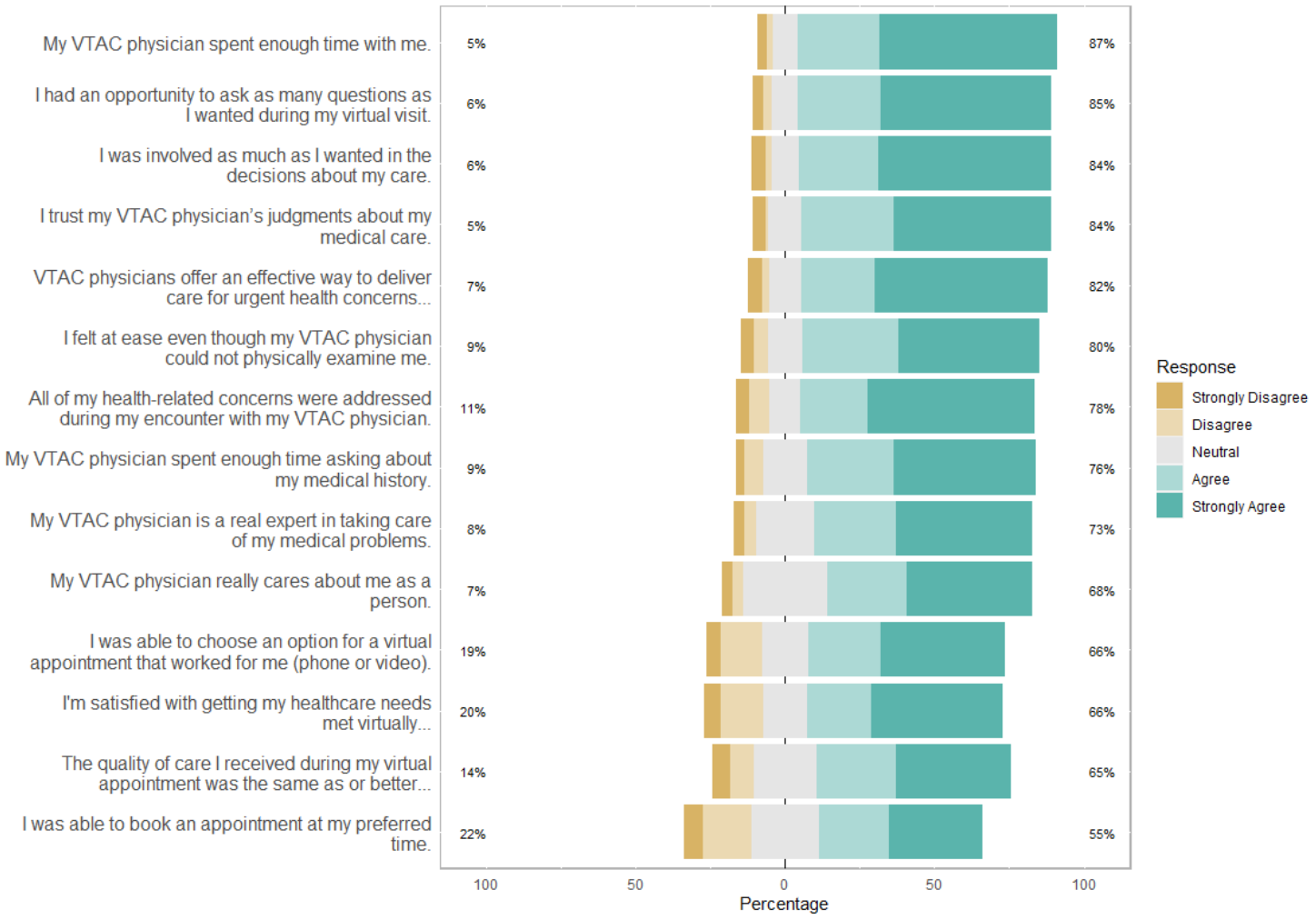

Figure 3

Likert-Scale Survey Responses: Patient Experience with Virtual Physician Appointments.

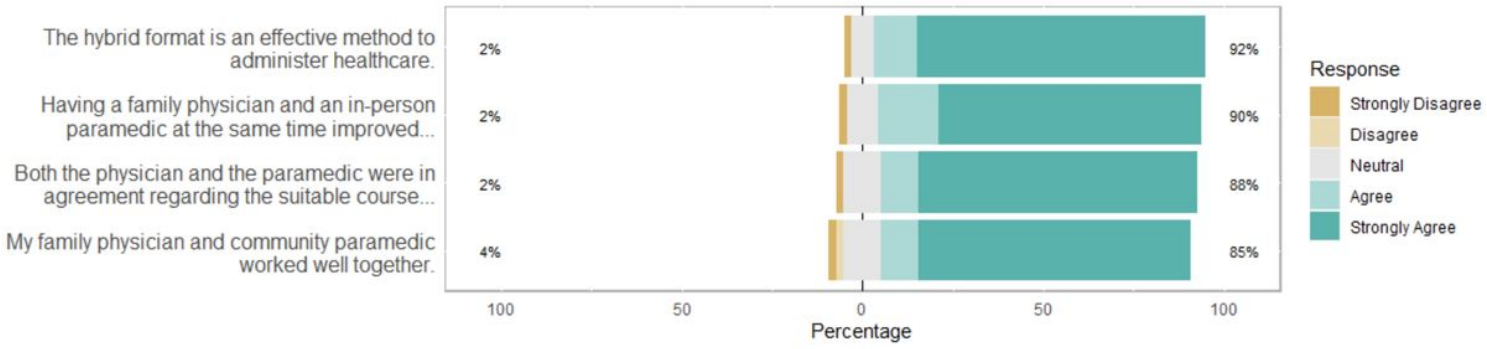

Figure 4

Likert-Scale Survey Responses: Patient Experience with Hybrid Appointments.

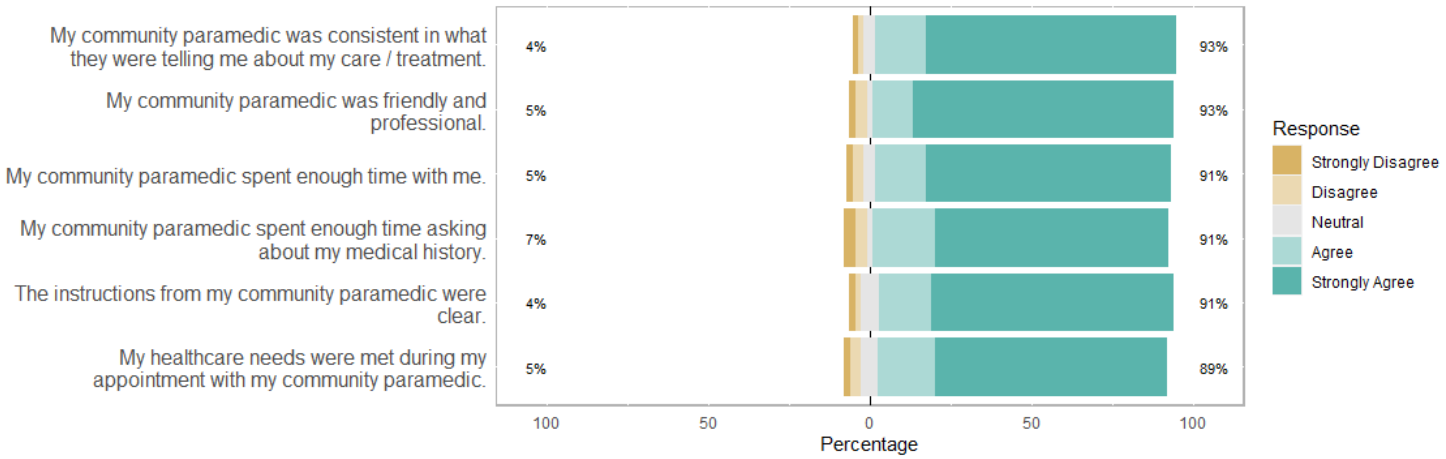

Figure 5

Likert-Scale Survey Responses: Patient Experience with In-Person Paramedic Appointments.

Supplementary Files

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- AppendixAtoC.docx
- SupplementaryTables.docx