



ROBSON VALLEY VIRTUAL CARE PILOT EVALUATION REPORT

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Digital Emergency Medicine



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

FACULTY OF MEDICINE

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Executive Summary

Family physicians throughout rural and remote communities in BC provide excellent primary and emergency care to their patients. Health professionals practicing in rural or remote communities may experience challenges in being able to access useful and timely collegial support. The aim of the Robson Valley Virtual Medicine Pilot was to implement and evaluate the use of digital technologies for on-demand support in emergency care. Videoconferencing, as well as secure text messaging was used for real-time virtual care consultations between family physicians in the Robson Valley and emergency physicians in Prince George, as well as for nurse to physician consultations from community emergency rooms to the local on-call family physicians within the Robson Valley. Other technologies such as Google Glass were explored in a limited way in the context of the pilot. The purpose was to use virtual care to facilitate timely access to high quality, comprehensive, coordinated team-based care, particularly in emergency care situations.

Phase 1 of the pilot project sought to identify virtual care use cases and evaluate outcomes for:

- Patient health,
- Patient and provider experiences, and
- Cost of health care delivery.

Phase 2 of the pilot project then evaluated process outcomes regarding:

- The role of relationships among care team members,
- Normalization of virtual care into routine usage,
- Impacts and innovations, and
- Physician Remuneration.

Focusing on the target population of patients and healthcare providers in and around McBride/Valemount/Robson Valley, evaluation of this virtual medicine pilot project used a framework based on the Triple Aim. Over an 18-month period, the virtual care service was used and evaluated in 26 just-in-time consultations. Eleven formative evaluation interviews and six pre-post interviews were conducted with six family physicians as well as one pre-post focus group with emergency physicians. Data was also collected from patient letters, as well as stakeholder consultations and use cases reviewed to further explore remuneration. Data analysis conducted by the evaluation team produced key findings and shaped practical recommendations.

This final report first contextualizes the pilot project, and then explores key findings, lessons learned and recommendations related to each phase of the pilot and the associated outcomes. The findings reveal significant impacts on patient health, patient and provider experience, as well as the health care costs. Key findings of the virtual medicine pilot project can be summarized as follows:

- Rural family physicians began integrating virtual care technologies into their daily practice, in addition to just-in-time consultations. This increased collaboration and coordination of care, and contributed to the normalization of virtual care services.

- The visual component and immediacy of the technologies used during the pilot led to improved patient care, better communication during consultations, and stronger relationships among participants at all sites.
- Physician adoption of virtual health was successfully normalized by developing and strengthening relationships across sites, and through the use of virtual medicine technologies for purposes beyond patient consultations to develop comfort and familiarity with the equipment.
- Rural family physicians reported an increase in opportunities to build skills and knowledge, in learning from emergency physicians. They also reported reduced stress and increased job satisfaction.

In the formulation of key findings, evaluators also identified issues which require further consideration and attention to sustain and expand virtual care in BC:

- Responding to workflow issues for both rural teams setting up virtual care consultations while they are treating patients, as well as for consulting emergency physicians working in a triage system that does not currently integrate virtual care needs.
- Expanding the project sufficiently to determine whether cost savings are significantly reduced due to fewer transfers and tests ordered.
- Addressing the limitations of the current billing codes available in BC's fee for service payment model to appropriately support health professionals for practicing virtual care, and thus improving the health system's productivity and cost effectiveness.

Background



Figure 1: Map of Robson Valley.

It takes over 2 hours to travel from McBride to Prince George.

Robson Valley, located in northern British Columbia, is home to a number of small rural communities, including McBride and Valemount [Figure 1]. Family physicians in these communities have identified gaps in care, including access to timely health care, and access to medical equipment and support services.

There are five practicing physicians serving McBride and Valemount; however, during weekends or after-hours, one nurse and one physician attend to the emergency clinics in both communities. The physicians cover both communities when on-call, resulting in communities alternating physician support. Currently, patients may have to travel 90 kilometers between Valemount and McBride to physically see the physician on-call. In emergency situations, patients are transferred to Prince George, which is over 200 kilometers away.

In 2015, there were two deaths on the road between Robson Valley and Prince George while patients were being transported to and from medical appointments. Technology, and more specifically, virtual care is an innovative solution that could mitigate risks associated with transporting patients, in addition to reducing patient and health system costs.

The Robson Valley Virtual Medicine project is tracking and evaluating opportunities provided by virtual medicine and technology to enhance and support high quality, comprehensive, and timely team-based care given within primary care homes in a coordinated manner. Project objectives include:

1. Identifying different use cases of virtual care, and how they impact patient access and outcomes, patient and health care professional (HCP) experiences, and cost of health care delivery;
2. Scrutinizing the importance of care team relationships in impacting virtual care uptake and usage; and
3. Discerning the progress from uptake to normalization of virtual care into routine usage.

Findings from this evaluation will serve to iteratively improve virtual care services during early implementation and will inform recommendations for future virtual care projects.

Evaluation Framework

The Robson Valley Virtual Medicine project evaluated two primary modes of service delivery, synchronous and asynchronous:

1. Just-in-time consultation on demand, using real-time, on-demand videoconference service; and
2. Secure text messaging service, image sharing and communications for asynchronous consultation.

As “use cases” occurred over time, they were assessed according to three health service delivery contexts:

1. Within Robson Valley (rural)
2. Robson Valley to Northern Health/Prince George regional site (regional hub); and
3. Robson Valley to Vancouver General Hospital (VGH) (urban).

Both summative and formative evaluations of use cases are described below. Data were collected via surveys, interviews, focus groups, and record reviews. In-depth description of communities and practice settings, and qualitative inquiry were used to systematically provide an explanatory framework for outcomes. The evaluation framework (see Appendix A) was finalized in consultation with the project advisory team to ensure that evaluation aligned with project goals, context and practice settings, as well as emergent needs.

Summative Evaluation

The summative evaluation explored the outcomes the program achieved, as well as the impact of the project on physicians and patients in the Robson Valley (rural) and Prince George (hub). Evaluation questions and indicators were developed in alignment with the IHI Triple Aim Framework¹, which evaluates programs using three dimensions: user experience, population health, and cost.

Formative Evaluation

A formative evaluation was embedded in the framework to document and understand how the program is implemented and functions over time. The formative evaluation, aimed at quality improvement, occurred throughout. Formative evaluation activities explored the development of the virtual care service and its evolution throughout the project. The findings will support an informed expansion and/or future roll out of similar programs.

Phase 1 Findings

In November 2016 the virtual medicine project was launched in the Robson Valley and Prince George. The virtual care service was used and evaluated for a three month pre-pilot “normalization” period, with **3** cases documented. Between April 1–July 31, 2017, this service was used for **23** just-in-time, on-demand consultations, enhancing quality, comprehensive, team-based care (see Appendix B for case log protocol). A total of **26** cases were assessed across both periods.

Six individual interviews during the normalization period, and eleven formative interview sessions were conducted with six physicians from McBride, Valemount, and Prince George to better understand their

¹ Berwick, D. M., Nolan, T. W., & Wittington, J. (2008). The Triple Aim: Care, Health and Cost. *Health Affairs*, 27(3), 759 -69.

experience and impact of this service. Interviews addressed the 26 use cases for analysis (see Appendix C for case follow-up interview protocol).

Health of Population

How has virtual care service impacted health outcomes for Robson Valley communities?

As a result of the virtual care service, patients who present at McBride or Valemount hospital in the Robson Valley with acute emergencies are now receiving medical services (e.g., cardioversion) that were not regularly conducted in the community prior to the introduction of this project. Virtual care has provided rural family physicians with a direct connection to a Prince George physician who provides guidance when conducting unfamiliar medical procedures. This support has improved rural patient health outcomes by reducing patient transfers to the hub in Prince George, and stabilizing patients who are transferred prior to transport, thus, reducing risks associated with travel.

Across virtual cases conducted, 95% of family physicians and nurses agreed or strongly agreed that using this service improved safety for their patient.

For patients who visit McBride or Valemount hospital with non-emergencies outside of regular clinic hours or while the doctor on-call is located in the other community, virtual care now allows patients to see a doctor virtually via a videoconference. Prior to the virtual care model, patients would either see a

“[When] you see the patient, you will estimate their condition much more accurately than anybody else can describe it to you”

– Family Physician

registered nurse who would telephone the doctor on-call and verbally describe the presenting health condition (e.g., a rash); or patients would be advised to travel the 90 km distance to see the doctor on-call in person if the nurse was unsure about the patient diagnosis. The videoconference service has improved everyone’s (patient, physician, registered nurse) confidence in the diagnosis, which has reduced unnecessary patient transfers.

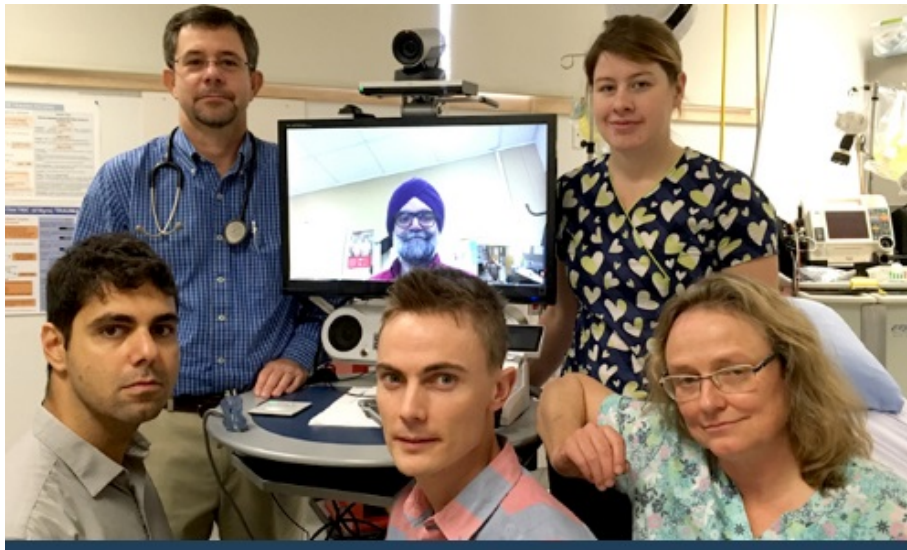
Health provider experience

Rural family physicians in Robson Valley described a significant improvement in their quality of life as a result of the virtual care service. Specifically, participants mentioned an increase in confidence dealing with unfamiliar medical cases, less stress related to on-call and telephone medical diagnosis, and improvement in communication with emergency physician colleagues in the hub of Prince George.

“[Telehealth] decreased anxiety and fear in handling these cases where time is crucial for saving the patient”

– Family Physician

Emergency physicians in Prince George similarly described an improvement in communication with Robson Valley physicians and described their positive experiences as a way to share knowledge between rural and emergency physicians. Physicians at the hub in Prince George, however, also expressed challenges integrating a new service into current emergency workflow due to limited time and human resource capacity.



How has virtual care impacted workplace satisfaction?

- As a result of the virtual care service, rural physicians can complete patient consultations from their home via videoconference when they are on-call, reducing the travel to and from the health clinic. Moreover, virtually seeing the patient increases confidence in the doctor’s diagnosis, which reduces work-related stress and overall improves workplace satisfaction.
- Virtual care has improved communication between Robson Valley and Prince George physicians, which has reduced miscommunication and made patient consultations easier.

- This model has increased workload and complicated the emergency triage process for physicians in the Prince George hub. It is necessary to continue making system and process changes to mitigate increased stress for consulting emergency physicians.

Emergency physicians emphasized that the virtual care service contributed to:

- **IMPROVED COMMUNICATION** between emergency and rural family physicians. As a result of virtual communication, emergency physicians gained a better understanding of rural physician’s context as they were able to virtually see the conditions and resources available. This additional context provided via virtual care improved physician communication, simultaneously improving the support emergency physicians provided rural physicians.
- **KNOWLEDGE SHARING** between hub-based emergency and rural physicians. The virtual care services provided an opportunity for both rural and emergency physicians to share knowledge and learn from each other about medication dosages and medical procedures.
- **WORKFLOW CHALLENGES.** Virtual care is not currently integrated into the emergency triage process because there is not enough volume of cases. As such, Prince George physicians currently receive text messages from Robson Valley physicians when they need to connect via the video link. Emergency physicians are required to coordinate and facilitate the video link, which takes time and resources away from the emergency department, creating workflow challenges.

Rural physicians emphasized that the virtual care service contributed to:

- **INCREASED CONFIDENCE** in medical decisions and diagnoses as a result of either participating in a virtual consultation with the patient, or having an emergency physician confirm diagnosis and treatment plan through the videoconference.

*In 24 out of 26 cases, participants **agreed or strongly agreed** that they were confident in their ability to participate fully in the virtual consultation.*

- **REDUCED FEELINGS OF ISOLATION, ANXIETY AND STRESS** associated with making quick decisions based on clinical symptoms. Using a team-based care model, rural physicians felt supported by Prince George emergency physicians.
- **IMPROVED PARTNERSHIPS** between rural and hub physicians as a result of the virtual face-to-face interactions and communication. Participants indicated that the virtual nature of virtual care improved communication and relationships between physicians, because of factors including non-verbal cues and body language, and thus resulted in better patient consultations.
- **FOSTERING PROFESSIONAL DEVELOPMENT** among rural and hub physicians, due to lively discussions regarding appropriate treatment, medication and dosage for unusual medical cases.
- **BUILDING CAPACITY AND PHYSICIANS SKILLS** since the virtual service allowed Prince George physicians to support the Robson Valley physicians in the treatment of complicated or unusual medical cases.

Patient experience

Physicians recounted that patients were satisfied with the standard of care they received. Rural physicians described that non-verbal cues such as their facial expressions and body language suggested that patients were relieved and happy to see a doctor through virtual means compared to prior to the implementation of this project.

“The more hands involved, the better. The experts were right there on hand. It gives great assurance for the patient that they were in good care with two doctors on hand and two doctors on video.”

-Patient



The rural family physicians provided their perception of the patient experience based on body language, non-verbal, and verbal cues. In summary, physicians perceived that:

- The virtual nature of virtual care can change the physician-patient interaction and shift power dynamics. Physicians noted that they felt patients were more comfortable asking questions, and seeking clarification about medical diagnoses, overall improving patient satisfaction of care.
- Patients were surprised, amazed, and relieved to virtually see a doctor on the videoconference.
- The visual presence of a family physician via videoconference reassured patients in their diagnosis compared to before the introduction of virtual care, when a nurse would diagnose with the physician via telephone.
- To the best of the physicians' knowledge, patients never voiced complaints of integrating virtual care service into their care.

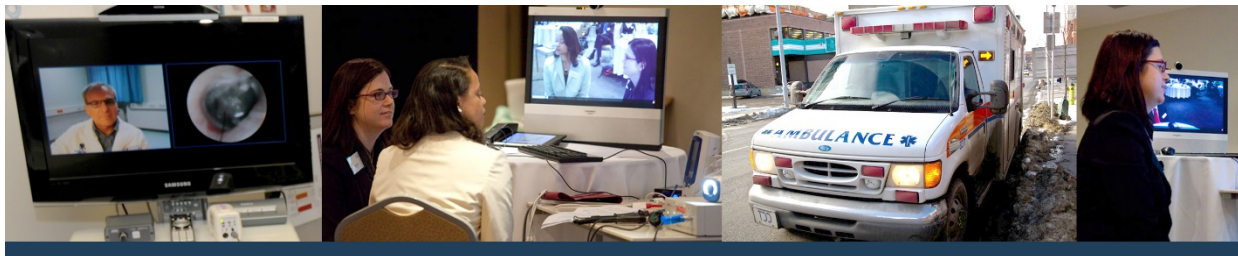
- Most patients who saw family physicians via videoconference also had a face-to-face follow-up consultation with a doctor in the following week. This suggests that while virtual care reduces unnecessary patient transfers, it may not reduce unnecessary patient visits to a health clinic.

“[Patients] thought it was amazing that a doctor could see them because... if they... call a doctor in, they feel guilty”

-Rural Family Physician

Cost Impact

Quantitative administrative data were not collected for the purposes of cost impact analysis. Cost impact indicators were included in interview protocols to provide perspectives on the financial impact of those involved in the Robson Valley project.



What is the cost impact to the system?

Analysis of interviews with providers described the potential for virtual care to have an impact on health care costs. Costs were saved by both the health system and the patient with the introduction of virtual care.

- With fewer patient transfers from Robson Valley to Prince George, significant **ambulance service fees were saved**.
- **The health system’s efficiency improved**, as non-emergency patient consultations take less time when physicians on-call are able to virtually diagnosis patients, compared to the time it can take for a nurse to liaise with a physician to verbally describe a patient’s presenting medical condition.
- **System overload was reduced**. Many patients that present to the emergency room are not characterized as an ‘emergency’; thus, virtual care can be used a platform to quickly determine a patient’s medical condition and reduce system overload.

What is the cost impact for patients?

Similarly, providers expressed that virtual care has the potential to have an impact on patient costs in the following ways:

- **Eliminating patient travel** to and from Prince George saved the patient time and money attributed to loss of work, transportation costs, etc. Prior to virtual care implementation in the communities, patients would be required to travel either by personal vehicle or bus to Prince George, increasing

cost, and strain on the family, etc. Additionally, patient family members no longer needed to travel, further saving transportation costs, lost work time, etc.

- **Patients are diagnosed and treated more efficiently, spend less time in the hospital, experience reduced wait times, and overall increased patient satisfaction with health care system.**
- **Virtual care reduced barriers to accessing health care** for patients unable to easily access a health facility. These patients were able to visit their physician via videoconference from their local clinic or home, as exemplified by oncology and palliative patients.

Lessons Learned from Phase 1

Experiences from the pilot evaluation have provided real-world insights for virtual care use in service delivery. These insights have been categorized thematically as listed below in terms of: 1) technology; 2) capacity building; 3) workflow; 4) clinical considerations; 5) health system considerations; and 6) partnerships and collaboration.

TECHNOLOGY

- Use ongoing evaluation and quality improvement to solve “on the ground” technological issues, and work out emergency usability issues collaboratively with technology partners.

CAPACITY BUILDING

- Virtual care is a successful tool for expanding rural doctors’ knowledge and skills to treat unusual medical cases.
- Involve experienced virtual care users in its introduction to encourage colleagues to use the system for everyday activities to gain familiarity, and be available to answer questions and listen to challenges. These steps likely increase uptake and normalization of virtual care among care teams.
- Build comfort through using equipment for educational, administrative, practice, quality improvement.

WORKFLOW

- The pilot implementation increased workload and complicated the emergency triage process at the hub site in Prince George.

CLINICAL

- Under certain circumstances, virtual care lacks the physical interaction afforded by a patient visit and can reduce the quality of the consult (e.g., palliative patient).
- Future virtual care projects may see expansion of services to home-based virtual care for patients. For certain patients this may improve access to care, as was the case for a physician who consulted with a palliative patient via WebEx. For others, it may increase patient privacy, especially in small rural communities where most people know one another. For example, home-based virtual care visits may improve privacy in cases where adolescents are seeking contraceptives, but do not want to be seen visiting a doctor’s office.

HEALTH SYSTEM

- Virtual care improves system efficiency under non-emergency circumstances, and in acute circumstances it improves patient stabilization and health outcomes.

- Currently, the province has billing codes to support virtual care in one form: face-to-face videoconferencing. The Robson Valley experience suggests that a more varied financial scheme to support further implementation of virtual care is needed.
- In order to support the scale and spread of virtual care to improve service delivery, improve patient outcomes and improve health equity for patients in rural and remote locations of the province, a physician payment scheme that allows doctors to adjust to new processes and procedures using the new equipment without financial penalty is needed. In the case of Robson Valley, physicians are not on a fee for service system (instead driven by other factors such as volume), thus, making it conducive to introducing a new service, such as virtual care.

PARTNERSHIPS AND COLLABORATION

- Virtual care has improved partnerships between rural and non-rural physicians.
- In some clinics, there remains resistance from doctors to participate in virtual care, despite positive health outcomes and system improvements.

Recommendations from Phase 1

Based on key findings and lessons learned in Phase 1, the following recommendations were developed for policy-makers and stakeholders to improve current virtual care services and scale-up virtual care projects:

- To achieve truly successful integration of virtual care, all partners in the team-based care model should be involved in using virtual care. For example, regional and provincial service partners such as BC Ambulance Service should also be engaged in virtual care, as they are a critical partner in delivering care in rural settings.
- When scaling up, technology companies should be engaged in the delivery of virtual care to most appropriately adapt technology platforms for the needs, format and usability of the care team and communities. Virtual care usage is not one-size-fit-all, but an adaptation of technologies in a variety of determinable patterns of use cases.
- Findings indicate reported improved quality of care and simultaneous cost savings for patients and health care providers involved in this pilot. As such, a robust cost analysis and evaluation is recommended to validate and accurately quantify the cost savings accrued by virtual care. This would support a stronger business case to introduce and scale up virtual care models.
- Processes and funding models must be further examined to optimally support virtual care service requirements and normalization. Considerations include:
 - Formalizing clinician engagement and training of technologies prior to service delivery, and planning for ongoing training;
 - Addressing increased workload and stress for physicians in the receiving communities (in this case, Prince George);

- Adapting emergency triage processes to address the integration of virtual care cases in the receiving community (in this case, Prince George);
 - Compensation for involvement of primary care, emergency medicine and various specialties as required for rural-based diagnosis and treatment (e.g., emergency); and
 - Creating new positions to support virtual care services, such as an emergency physician dedicated to virtual care providing consultations to rural physicians.
- Practical recommendations and tips for effective and sustained virtual care usage should be documented and shared among those using the technologies. These tips could also encourage virtual care uptake in new communities. Recommendations noted by physicians during the pilot included use of wireless equipment (to reduce tripping hazards on cords, and to facilitate movement as needed during virtual consultations); to allow users remote control of the camera from both ends of the virtual consultation; and to use a video link as a first point of contact for physicians rather than coordinating the video link via telephone first, thus saving time.

Phase 2 Findings

Phase 2 of this virtual care project focused on analysing what was experienced and learned over the course of the pilot project as well as exploring expansion of the service. Building on the outcome evaluation of Phase 1, Phase 2 aimed to evaluate perceived impact and normalization processes through the following key questions:

1. To what extent has this project been implemented as planned?
2. To what extent did project partners/stakeholders work collaboratively to achieve project goals?
3. What is required for the service to continue and grow?

A range of data collection tools were employed to adequately address these key questions. Retrospective pre-post interviews (See Appendix D for interview protocol) were conducted with six participating Robson Valley family physicians. Interviews explored pilot project achievements, factors enabling success, challenges/barriers experienced, innovations, remuneration, as well as normalization and expansion of virtual care services. An adapted version of the questionnaire was used to conduct a focus group with two Prince George emergency physicians to evaluate impact, normalization, and remuneration from the perspective of those providing support to rural family physicians. Two patients who benefited from the pilot project wrote letters, providing insight around patient experience. A stakeholder consultation was held to explore physician remuneration for virtual care services, to assess what is working, identify gaps, and suggest ways forward. Insights and documentation from pilot project implementation and evaluation team meetings were also used as data points.

Of the six rural family physicians interviewed for the summative evaluation, four had no prior experience with virtual care. One had regularly used telephone for patient care, along with email and limited text messaging. The other had prior experience using a cellphone app to take pictures and send them to a specialist during emergency situations. This physician also had experience using videoconferencing with remote communities, prior to this pilot project.

The pre-post interviews captured the physicians' expectations going into the pilot project as well as the impacts they experienced and observed in emergency support, on-call coordination of care, patient transfers, workflow, patient responses to virtual care, and costs.

Prior to the start of the project, rural physicians expected virtual care to improve quality of care as they would be able to get assistance on difficult cases in real time. They expected this would lead to better care of patients and to better health outcomes. One physician did indicate a concern that emergency physicians would recommend a patient be treated in the home location even though the medical team did not have the resources, skills, or experience needed. The rural physician indicated that conditions seen as commonplace and simple to a specialist would be outside the generalist skill set and experience. In terms of expectations regarding patient care, this was the only concern articulated and the physician indicated that it was not experienced during the pilot project.

Overall, physicians expected that virtual care would improve collaboration and communication between nurses and doctors. They expected that seeing the patients via videoconferencing would make it easier to diagnose and to make treatment decisions. One physician saw virtual care as a way to overcome the challenges of the distances involved, both in terms of referrals and for care between the two communities. One expected it would "...make life easier and better for the patients" which would then make the work easier for the rural physicians.

Impacts of the Pilot Project

Emergency Support

Rural family physicians reported a reduction in stress when covering local emergency rooms, either in-person or on-call. When seeing a patient in the local emergency room, videoconferencing gave rural family physicians access to immediate expertise from emergency physicians for cases that were unfamiliar or complex. Prior to the availability of virtual care, consultations with emergency physicians by telephone were briefer and less in-depth than what is possible with videoconferencing. One experienced rural family physician said: "...I feel way more comfortable in the emergency room instead of the discomfort I had on the emergency side." This reduction in stress improves thinking and concentration and makes this work go more smoothly, according to another rural physician. Knowing that someone could be reached for advice through virtual care increased the comfort level in the emergency room, even for more experienced physicians. Rural physicians reported that virtual care resulted in being more relaxed, comfortable, and happier in their work.

On-Call Coordination of Care

One of the aspects of virtual care that was of great benefit to patient care was being able to visually see patients and colleagues. This was a significant benefit when nurses in community emergency rooms were consulting with on-call rural family physicians. Rural physicians found it much easier to diagnose patients in this way than by hearing descriptions over the phone. Seeing the severity of injuries improved their ability to make decisions about treatment and transfer. One physician noted "...it actually allowed me to make...some clinical decisions regarding both of the patients." The ability to see what the nurse was doing

and to communicate directly with the patient allowed for better insight and care, “...giving us a much better idea on what’s going on with [the] patient on the other side.”

Rural family physicians found that virtual care also provided significant benefits when on-call. There was increased comfort for rural family physicians and nurses “...around being on-call and making decisions and kind of managing the uncertainty.” The ability to have direct, visual interaction with patients using videoconferencing, was a significant benefit. One rural physician shared that by using videoconferencing “...together [we] make a plan in a situation on how to manage a specific situation and the patient is included in that. On a telephone call that’s not necessarily the case.” When on-call for their local emergency rooms, the ability to see the patient and their condition enabled better and faster decision-making and treatment, leading to better clinical outcomes.

In addition to the video interaction itself, rural family physicians improved patient care by being better able to explain cases to colleagues (nurses, other physicians, the ambulance service) having seen the patient over video. Rural physicians reported that videoconferencing and Google Glass also made handovers smoother and made it easier to cover other patients and other communities.

Transfers

Both rural family physicians and emergency physicians reported that virtual care decreased the frequency of transfers from Robson Valley emergency rooms to Prince George. As well, they indicated that virtual care improved the safety and health outcomes of patients that were transferred.

Being able to evaluate patients visually through videoconferencing or Google Glass prevented unnecessary transfers from rural emergency rooms to Prince George. Previously, if it was not clear from the telephone consult that the patient could wait, then a transfer would have been initiated for an in-person assessment. With videoconferencing, an assessment could be conducted immediately, and a transfer was then not needed in some cases. In at least one case, a patient was successfully treated locally and then sent home, whereas the condition would previously have resulted in a transfer and possibly an overnight admission.

When a transfer was necessary, an emergency physician highlighted that using videoconferencing in advance of the transfer maximized the stability of the patients. Videoconferencing was used to ensure patients were as stable as possible before leaving the community emergency room, particularly because ambulances can be out of cellphone range for part of the transfer. One physician noted “...that’s why we want to be able to do as much as we can before they leave.”

With videoconferencing, rural family physicians experienced more in-depth interaction than they had when arranging a transfer by telephone. The emergency physician was more involved in making decisions, observing, and assisting with procedures. When emergency physicians can see what the rural family physician sees, and can see the patient directly, it also helps with communication difficulties.

Workflow

Using this system has built confidence and skills, enabling rural family physicians to be more relaxed when on-call. It has also improved the standard of care and made physicians more comfortable with patient

outcomes. It improves workflow in terms of case notes and transfer letters as physicians are not relying just on verbal descriptions. As one physician reported, “Now we get the other doctors involved in the workup of the patient, so they know what's coming their way and they know what's done. It's just a much better situation for care of that patient.”

One rural family physician spoke specifically of impacts on workflow locally, using the system for improving the process of handovers and for consulting with nurses when on-call. Another physician reported usage of videoconferencing for home visits, an innovative addition to the pilot project introduced by physicians themselves. Rural physicians indicated that through the pilot project, virtual care has been embedded in every day workflow, improving patient care for home visits, seeing patients in other communities, handovers, and bringing a specialist into the local emergency room. One physician emphasized “I would say significantly embedded – I can't imagine practicing without it now.”

Incorporation of virtual care into workflow was more challenging for emergency physicians. Whereas, usually they would provide a quick telephone consultation, virtual care required longer, more involved encounters that were not part of the triage system. Other impacts on practice for emergency physicians included increased documentation of virtual care consults as well challenges in determining how to bill for virtual care services.

Patient Responses

With regards to patient impact, physicians saw virtual care as a way for them to receive a better quality evaluation without having to travel. From the observations of rural physicians, patients appeared comfortable with virtual care and surprised by what was possible. All rural physicians interviewed indicated that the project was of great benefit to patients, pointing to less travel, improved access to services, increased patient confidence levels, and improved quality of care. Emergency physicians also felt that their presence was welcome and reassuring to patients.

This analysis is supported by letters received from two patients. One patient indicated that they had felt “completely secure”. They indicated their experience with two local physicians and two nurses, assisted by two emergency room physicians via video link, was both personable and professional. The second patient, who had been able to confer with specialists via videoconferencing, stated “In place of extensive travel and costs, I am able to use virtual care which greatly improves my quality of life, while providing me with high quality health care.”

Costs

Rural family physicians reported a number of potential cost savings due to the use of virtual care in this project. One indicated that savings would result if patients could wait to be seen in the morning within the Robson Valley, reducing transfers costs as well as congestion in the Prince George Emergency Department. On-call rural family physicians' ability to see patients and interact with them directly resulted in more decisions that immediate treatment or transfer is not needed.

Another rural physician indicated there could be cost savings as fewer tests are ordered. When rural family physicians cannot see a patient, they more likely to order additional tests. One physician shared “Like, for instance, if I have somebody whose got an injured arm and I'm hearing it over the telephone as opposed

to seeing what it looks like I'd probably order more x-rays." There could also be a reduction in repeat visits as on-call rural family physicians can make an immediate assessment using videoconferencing rather than having the patient return to be seen in-person the next day. In one interview a physician noted that "...the other cost saving would be no repeat visits so sometimes things are able to be dealt with simply... then I'll be more likely to say 'that's kind of fine you don't need to come back here in the morning'..." In addition to healthcare system cost benefits, personal cost savings for patients was also identified as a benefit of virtual care. One patient spoke specifically about significant personal cost savings as they could travel a much shorter distance to Valemount for a consult with oncologists using the videoconferencing system, rather than traveling the much greater distance to Prince George.

It is important to note that although there were cost savings identified, rural physicians also reported some cost increases; for example, the need for high-speed internet in physicians' homes as well as higher data usage. Furthermore, the equipment and licensed cellphone apps being used were perceived as expensive by the rural family physicians. It was suggested that there is potential to decrease costs while maintaining the same quality of service. In particular, Skype for Business was mentioned as an affordable and accessible option; however, as a platform it may be neither stable enough nor secure enough for use in a virtual care context.

Uptake and Normalization

Both barriers and enablers to the normalization of virtual care were experienced by rural physicians and emergency physicians during the pilot project. Recommendations to address barriers and leverage enabling factors in the uptake and normalization of virtual care services were shaped by key findings discussed below.

Barriers to Uptake and Normalization

TECHNICAL CHALLENGES

The technology itself is where most physicians expected challenges prior to the project. Physicians were much more likely to expect technical challenges than social challenges. Almost all indicated that they expected the technology to be difficult to set-up and to use, especially in moments of crisis. Only physician expected it to be easy to use and stable. Other expectations around the technology were that it would be an additional drain on their time and that it would contribute to the rapid workflow: "...I expected the challenge to be more rapid workflow than the practical, technical implementation."

Technical problems, especially in a crisis situation, were identified as a barrier to uptake of virtual care. One rural family physician suggested that it would be difficult to deal with any technological glitches during a crisis, whether caused by internet connectivity or simply pushing the incorrect button. Early in the project, there wasn't sufficient internet bandwidth available to use the videoconferencing technology in Robson Valley locations. Although this issue was immediately addressed in primary locations, it was noted as a potential barrier to expanding the use of these technologies in other rural communities. One rural family physician couldn't use the system at home at all, as they didn't have high speed internet or the right equipment and setting it up on own computer was difficult. This participant felt that a single purpose unit, like an iPad, would be a better solution. Sufficient wireless speed was another challenge

identified. Experiencing technical problems has the potential to slow or even halt uptake. As one physician noted, “...we ran into that with Google Glass. Initially it was really unstable and people just stopped using it.”

ROLES AND LEARNING NEEDS

Setting up the videoconferencing system and initiating the call was challenging for both rural physicians and emergency physicians, partly due to learning the system and partly due to lack of personnel. Providing patient care at the same time as initiating the call was challenging, particularly for one physician who noted “...that was difficult for me in the beginning, to take myself away from the patient that needs me to go make a phone call to get a video system going.” Training clinic staff to assist provided an improvement, but having a system where a call could be initiated quickly would be useful. The number of steps to set up a videoconferencing link was mentioned as a barrier, by both rural physicians and emergency physicians. It was often the doctors themselves setting up the link while caring for patients at both ends. Communication was more complicated if multiple doctors were involved.

Level of comfort with technology was suggested as a possible barrier for uptake among physicians, as was sufficient practice for normalization to occur for all health care providers. Using the various technologies on a more frequent, even daily basis, could speed up the process of normalization. As rural family physicians and nurses began incorporating the technologies into handovers and other situations outside the intended emergency and on-call uses, there was an increase in ease-of-use and embedding in practice. Linked to this is the possibility of locums or physicians returning from sabbaticals not being aware of the technology or not having learned how to use it yet. New workflow patterns could be disrupted until new or returning team members have sufficient training and practice to reach the same level of uptake and normalization.

WORKFLOW

So far, only the Emergency Department at Prince George has been available for consultations. Rural physicians indicated that it would be useful to consult with the specialists they are referred to, whether they are internal medicine physicians in Prince George or specialists in Vancouver. One rural family physician suggested that expanding virtual care in regional referral centres like Prince George could provide on-call access to other specialties like orthopedics. This physician stated that they have access to “...the emergency department but for none of the internal medicine people who we’re generally referring to.”

In addition, as the ambulance service was not involved in the project, conversations had to be repeated or passed on by third parties when arranging a transfer. An emergency physician noted “...it is not linked to BC ambulance service so if I have a conversation with Valemount, and we talk about a patient and do some patient care and it is all through the video system, the doctor in Valemount has to get off video system, phone the patient transfer network, have a phone conversation with them, including probably the emergency advisor, and then he phones me and I have a conversation with him. If we use the video system we actually end up having to do things twice, because we do all of our care through the video system and then we have to do a phone call and have basically the same conversation all over again.”

On the emergency physician side, it was noted by one participant as beneficial to have a specialist on-call specifically for virtual care and for that person to be able to just pick up a device and be connected immediately: “I would suggest a physician who's job is dedicated partly to that. They might have a multiple role during that day, but if you have a physician who is not responsible for direct patient care in the emergency department that day, but instead had other responsibilities which might include getting support for out of line patient. Because they would be out of the sequence, you would be able to manage it.”

Having stationary rather than mobile equipment was raised as a significant barrier, particularly when it is not always available for use when needed. Rural physicians recommended having mobile virtual care units that can be used while on-call, both for themselves and for physicians on-call for consultations.

REMUNERATION²

BC currently has virtual care fee/billing codes to support physicians delivering virtual care directly to patients or through e-consults with other providers. Current codes are based on point-to-point, one-on-one teleconferencing. The codes however, do not reflect the growing range of accessible virtual care methodologies, particularly many-to-one and many-to-many forms of connectivity that can be used for on-demand clinical care.

Within this pilot project, variances were identified in how rural family physicians and emergency physicians are paid for virtual care work. Thus, there are opportunities to provide better support for the normalization of virtual care by addressing how physicians are paid and by providing a wider range of fee codes related to the growing range of virtual care services, from mobile videoconferencing to secure text messaging and more.

The Robson Valley physicians were all on contract so did not deal with billing or fee codes. Instead they indicated that job satisfaction, reduced worry around patient outcomes and even time saved were all informal forms of remuneration for virtual care services.

Emergency physicians indicated that the billing system is not currently set up to account for all virtual care services and it is difficult right now to figure out how to bill for this work. One emergency physician from stated that “one of the reasons I didn't bill for it is it's just too much effort. But if it's happening a lot, then I'm going to have to figure out how to do it.” It is important to note that while many specialties do have codes for virtual care, Emergency Medicine does not, nor are all emergency room physicians themselves specialists.

Different funding models for virtual care were discussed based on existing models in addition to current fee codes, and matching these funding schemes to the use cases would be vital to encourage appropriate use of this approach to support impactful patient care. It was suggested that when scaling up use of technologies and practices, we experiment with funding approaches that maximize health professional

² In the context of the Robson Valley Pilot, a stakeholder consultation was held in 2018 to explore more fully remuneration for virtual care in rural emergency care contexts. A summary of this stakeholder meeting can be found in Appendix E, along with a list of use cases discussed in Appendix F.

remuneration and patient quality of care while minimizing the risk of run away costs to the system to inform roll out (and design of appropriate fee codes).

Enabling Factors

The two most commonly articulated factors which supported the uptake and normalization of virtual care by physicians were building strong relationships and technology support. Evidence also points to the value of healthcare providers innovating and suggesting new features to grow their virtual care services.

BUILDING RELATIONSHIPS

Relationships between emergency physicians and rural family physicians improved during the project as they built trust. The rural family physicians felt that emergency physicians grew to understand that they were calling for the more complicated cases and that it was necessary and beneficial to take the video call. Emergency physicians reported that they gained a better understanding of the experience and skills of rural family physicians who do not see the same volume or kinds of cases. They saw the value in virtual care for critical care and for procedures that are less common for rural family physicians. This benefit was unexpected for one rural family physician who indicated that despite expectations that virtual care would help build relationships between doctors and nurses in Robson Valley, they hadn't expected the improvement in relationships with the Prince George emergency physicians.

One rural physician summarized the impact of these emerging relationships, saying "I learned how much we need each other in different professions and I think when we practice medicine in a rural community, you often just rely on yourself and what you have available locally. I think this has opened up a totally new world for me of practicing medicine, so I learned that we need each other so much and this is a way to reach out."

VIRTUAL CARE ADVOCATES

In order to expand the system to include more communities, physicians, and nurses, it will be important to have those who have experienced the system share their real experiences and successes. The value of having someone advocating for the system was also articulated as key to success, particularly in showing practical benefits and setting up expectations. Characteristics like tenacity and flexibility were suggested as useful traits for those advocating virtual care. Rural physicians reported that even hearing the positive experiences of others led to an increased comfort level and willingness to use virtual care technologies themselves, along with a belief that patient outcomes were improved by the virtual care.

Both rural family physicians and Prince George emergency physicians reported that stronger relationships were built during the project. This process was facilitated by videoconferencing technology which allowed for more in-depth interactions compared to phone calls. Furthermore, rural family physicians reported improved collaboration between themselves and nurses in the Robson Valley communities. Although the rural family physicians were already meeting every couple of months and had existing relationships, one rural family physician reported that being face-to-face on screen for handovers expanded the ability to communicate regarding patient care on a more ongoing basis. One rural physician suggested that

relationships are a foundational element of virtual care, upon which communities would then be able to adapt the system to meet their own needs.

The place where the two success factors of relationships and technology meet are with IT support. Participants indicated that these people were key to ensuring that the equipment worked smoothly and it was important to have access to them when issues arose.

TECHNOLOGY SUPPORT

Stable, easy-to-use technology was identified as a key enabling factor for the uptake of virtual care services. Physicians reported that clear, reliable audio and video as well as a simple connection process is critical to sustained usage of technologies. It was noted that equipment should be functioning well before providers are asked to use them, in order to reduce frustration and the possibility of resistance or discontinued use. This is especially important in emergency situations. Generally, it was felt that the system tested was very reliable and easy to use. There were some technical difficulties, but most were temporary and quickly resolved. One rural family physician stated that the factors most important to facilitating uptake of virtual care are: “Simplicity, reliability, and support.”

To build capacity around learning new technologies, physicians preferred to receive a list of simple steps over long manuals. Physicians indicated it would be helpful if capacity building could include useful tips and tricks; for example, having one person speaking at a time will maximize audio quality. One rural family physician indicated that “...the intellectual buy in was a breeze, there wasn’t a problem at all...but actually practically doing it...that was difficult.” Regular opportunities to use the equipment and incorporate it into workflows are needed to reduce fear and feelings of being overwhelmed by the technology. As well, everyone should know how to use the equipment. Normalization of the systems and workflow was highlighted as critical for success.

At the Prince George emergency room site, the location and mobility of the equipment as well as integration with existing hospital systems were identified as important enabling factors. As the videoconferencing equipment was stationary in one emergency bay, it was not always available when needed. Incorporation of mobile videoconferencing equipment would improve emergency physicians’ ability to respond to requests for consultations with rural family physicians. One emergency physician stated that “...I think integration with EMR and hospital information system needs to be very carefully considered as well. It has to work seamlessly and has to work often kind of quickly.”

CONTINUING INNOVATION

Innovative introductions and applications of technology, particularly when connected to areas of practice that are important to providers, were noted as a way to increase use of technologies, improve skill and facilitate normalization. Rural family physicians participating in the pilot very quickly identified ways in which virtual care technologies could be applied in other areas of their practice; for example, facilitating smoother handovers, as well as for scheduled appointments and routine follow-ups. Using these technologies for home visits and for non-emergent procedures were also mentioned as innovations developed during the project. Becoming more comfortable with non-face-to-face consultations has also

increased willingness to use other technologies such as email and text messaging. The ability to do clinics in other communities or cover when short-staffed was suggested.

Adding new features such as electronic ECGs, ultrasound, x-rays, and remote stethoscopes as well as the ability to send images such as photos to specialists, were also mentioned as ways to continue innovating. Physicians thought it would be useful to do a physical exam using a mobile, point-of-view camera, so rural family physician could see the full exam directly. Using this type of mobile technology for handovers would also increase benefits provided with the stationary video link. It was also felt that innovation applications of virtual care could also improve the ability of rural physicians to cover when short-staffed or to do clinics in other communities.

Recommendations from Phase 2

Based on key findings and lessons learned in Phase 1, the following recommendations were developed for policy-makers and stakeholders to improve current virtual care services and scale-up virtual care projects:

- Roll new technologies out gently over time. Pilots are an effective way to introduce and test new technologies, testing for bugs and developing simple training. Pilots can provide a foundation to scale up appropriate virtual care initiatives, informing evidence based operationalization and normalization strategies. It is also important to provide good communication and attention to misinformation and assumptions.
- Prioritize relationship building when introducing and /or expanding virtual care initiatives. Involve physicians with prior experience in facilitating uptake of telehealth, champions who can share personal experiences, benefits and tips.
- Keep abreast of new developments and choose the most appropriate technologies, factoring in cost, feasibility, maintenance and effectiveness in supporting patient care.
- Incorporate more virtual care technologies into referral centres, with dedicated resources and specialists. It was also suggested that physicians be provided with mobile devices that they can take with them when on call.
- Expand the pilot to gather more data on factors such as whether the number of transfers will be significantly reduced.
- Have someone facilitate virtual care encounters, someone who is not directly involved in patient care, so that physicians and nurses are not trying to do both tasks.
- Ensure introduction of new technologies be driven from within the community and based in patient needs.
- It is imperative to expand virtual care services as a way to promote equity of services and quality of care for rural patients.

Project Recommendations

Analysis of lessons learned, success factors, challenges, and impacts over both phases of this project point to the following recommendations, which may be informative for other jurisdictions incorporating virtual care:

1. Technology

- A. **TECHNOLOGY SOURCING:** Accessibility, usability, and stability are key in selecting technology platforms. As virtual care usage is not one-size-fits-all, platforms must be adaptable within a range of use cases as virtual care projects are tested and scaled up. Familiarity and cost will need to be balanced with security and purpose-built features.
- B. **TECHNOLOGY IMPLEMENTATION:** Practical recommendations and tips for using virtual care should be documented and shared among those using the technology, and to encourage uptake and use in new communities. Roll new technologies out gently, over time, with pilots to inform evidence based scale.

2. Health Human Resources

- A. **TRAINING:** Formalize clinician engagement and training of technologies prior to service delivery, and plan for ongoing training. Include teams in training so use of the technologies is normalized and handled by the appropriate person in each case.
- B. **INTEGRATION:** To achieve truly successful integration of virtual care, all partners in the team-based care model should be involved in using it. Regional and provincial service partners such as BC Ambulance Service should also be engaged in virtual care care, as they are a critical partner in delivering care in rural settings.
- C. **WORKFLOW:** Adapt emergency triage processes to address the integration of virtual care cases and address increased workload and stress in the consulting location. Significantly simplify initiation of the virtual care encounter or have it facilitated by someone not directly involved in patient care at the same time.
- D. **RELATIONSHIPS:** Build relationships before adding new technologies. Start with a core group of people who get to know each other and are supportive of the project and each other. Continue to strengthen relationships through engaging communities to link up with other trusted communities for discussion of how to normalize practice, and carry out simulations to build readiness. This is foundational to scale up and fully realize the benefits of funding for virtual care operationalization.
- E. **NORMALIZATION:** Incorporate new technologies throughout practice, including in lower-stakes situations, in order to familiarize and make usage commonplace. Build on and continue to strengthen relationships within and across communities.

3. Economic Factors

- A. **COST ANALYSIS:** A robust cost analysis and evaluation is recommended to validate and quantify the cost savings accrued by virtual care.

- B. REMUNERATION:** Support the development of compensation models so that virtual care can be adequately remunerated and sustained to serve rural populations. Further exploration through a controlled pilot implementation of various/hybrid remuneration models (with limited funding to support this exploration) would generate evidence-based approaches to sustaining remuneration for future virtual care implementation and operationalization. Along with compensation, address workload and time factors to further the adoption of virtual care.
- C. RESOURCING:** Create new positions to support virtual care services, such as an emergency physician dedicated to virtual care, providing consultations to rural physicians. Incorporate more virtual care technologies into referral centres and provide dedicated mobile devices for physicians on call.

Appendixes

Appendix A: Evaluation Framework

An evaluation framework has been collaboratively compiled by evaluation personnel connected to the initiative. Further development and finalization of the evaluation framework relied upon a participatory approach to enable co-construction with stakeholders to ensure that evaluation is grounded in the context of health service delivery in the communities, and is aligned with project goals.

Indicators Key: **Green text**- high feasibility/low difficulty to collect

Blue Text- medium feasibility/medium difficulty to collect

Red Text - low feasibility/high difficulty to collect

* Recommended

OUTCOMES EVALUATION			
Aim	Evaluation Questions	Indicators	Data Collection Methods
Health of Population	How has the telehealth service impacted health outcomes for residents of the Robson Valley/communities? Did users find the telehealth service beneficial for supporting their own (if patient) or patient's (if provider) care?	<ol style="list-style-type: none"> Provider rating of availability/timeliness of emergency services* Provider perception/account of improved clinical outcomes* Patient reported outcome/related to case* Patient and provider rating of patient safety including prevention of risks associated with rural population (e.g.) winter travel * Equity of services to rural patients Wait time for services 	<p>Administrative data/logging of usage (proportion of telehealth encounters vs total encounters)</p> <p>Surveys/interviews (perception of providers/patient self-report where possible and appropriate)</p> <p>PROMIS - where patient survey/interview appropriate</p>
Patient Experience	To what extent did the telehealth service impact the patient experience of care?	<ol style="list-style-type: none"> Improved experience of care (patient rating)* Acceptability of using telehealth for clinical purposes (patient rating, and provider perceptions of patient experience)* Quality of telehealth care (provider perceptions of patient experience)* Patient rating of overall satisfaction with telehealth* 	<p>Patient surveys and interviews where possible/appropriate including patient case description/narrative</p> <p>Provider interviews (perceptions of patient experience)</p>
Health Care Provider Experience	To what extent did the telehealth service impact the experiences of health care providers?	<ol style="list-style-type: none"> Number and type of health professionals involved* Method of first engagement of health professionals and type of engagement over time * Provider rating of overall satisfaction with telehealth* 	<p>Provider surveys including Technology Adoption Readiness Scale items</p> <p>Interviews</p> <p>Focus Groups</p>

Aim	Evaluation Questions	Indicators	Data Collection Methods
	<p>What were the participants' experiences with the technology/telehealth system?</p> <p>To what extent was the telehealth service incorporated into the health care provider's practice?</p> <p>How do participants describe overall/important learnings?</p>	<ol style="list-style-type: none"> 4. Provider rating of satisfaction with telehealth support* 5. Provider rating of their own comfort with telehealth* 6. Provider rating of impact of service on quality of care* 7. Provider description of impact on access to clinical support* 8. Provider description of impact on collaboration between and among providers/members of care team* 9. Provider rating of acceptability of using telehealth for communication with other providers/with patients* 10. Provider rating of usability of technology and procedures* 11. Provider description of perceptions and experiences of "normalization" of the service* 12. Provider description of most significant practice change* 	<p>Ethnographic documentation</p> <p>Case logs</p>
Cost Impact	<p>What were the types and volumes of telehealth services delivered?</p> <p>What was the cost impact to the system?</p> <p>What was the cost impact to patients?</p>	<ol style="list-style-type: none"> 1. Set up costs and ongoing costs of technology (cost of telemedicine unit) * 2. Number and types of cases (i.e., utilization)* 3. Number and types of health professionals involved * 4. Volume of utilization of different platforms (diversity of utilization)* 5. Report/description of cost savings for patient (i.e., travel, loss of work hours) by patient/provider* 6. Report/description of transfers saved via provider account* 7. #connections/endpoints (per case) *TBD 8. Volume of utilization of different platforms (diversity of utilization) by case *TBD 9. Duration of usage by clinician (per case) *TBD 10. Volume of transfers before and after service 11. Cost per person to participate in the service 	<p>Administrative data/logs</p> <p>Patient and provider surveys</p>

Indicators Key: **Green text**- high feasibility/low difficulty to collect

Blue Text- medium feasibility/medium difficulty to collect

Red Text - low feasibility/high difficulty to collect

* Recommended

PROCESS EVALUATION

Key Evaluation Question	Example Questions for Elaboration	Data Collection Methods
To what extent has this project been implemented as planned?	<p>Was the telehealth service implemented as planned? Please explain.</p> <p>What accomplishments were experienced?</p> <p>What enablers contributed to successful implementation? E.g., training, educational resources, supports?</p> <p>What challenges/barriers were experienced?</p> <p>Describe important lessons learned. Were lessons shared? In what way? Where?</p>	<p>Provider interviews/project team interviews/focus group</p> <p>Project Charter</p> <p>Meeting Minutes</p> <p>Ethnographic documentation</p>
To what extent did partners/stakeholders work collaboratively to achieve project goals?	<p>What was the nature of collaboration? What types of networking and relationship development occurred?</p> <p>What formal and informal bodies/ networks/ linkages were integral?</p> <p>What resources and services were provided and who provided them?</p> <p>To what extent do participants have a common understanding of project goals?</p> <p>To what extent are processes in place to keep partners informed and motivated?</p> <p>How were work and evaluation plans developed?</p>	<p>Provider interviews/focus groups</p> <p>Project Charter</p> <p>Meeting minutes</p> <p>Ethnographic documentation</p>
What is required for the service to continue and grow?	<p>How might new features of the service rolled out over time?</p> <p>What economies of scale may be realized?</p> <p>What would need to be in place for scaling up? To other jurisdictions? Other clinical applications?</p> <p>What are the types of support needed? Who needs to be involved?</p>	<p>Provider interviews/focus groups</p>

Appendix B: Case Session Log

Robson Valley Virtual Medicine Project

My location _____

Other location(s) involved

I am a: Physician Nurse Practitioner Specialist (specify) _____

Other (specify) _____

My role: I initiated the consult I was the consultant

Names of other provider(s) involved

Date of consult: _____

Reason for consult:

Approximate time of consult: _____

Approximate duration of call Less than 5 min 5 - 10 min 10 - 15 min More than 20 min

How often have you used this service since the start of the pilot project? (Check the most applicable below)

This is the first A couple of times Weekly Biweekly Monthly

Please rate your agreement with the following statements by checking the appropriate box.	Strongly Disagree	Disagree	Agree	Strongly Agree	Unsure
Using this service improved safety for my patient.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was confident in my ability to participate fully in the virtual consultation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was confident in the security of my patient’s information and medical history shared through this process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am satisfied with the standard of care maintained via this process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The use of this service increased efficiency.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The technology functioned seamlessly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overall, I was satisfied with the service.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please use this space to share any recommendations on improving this service.

Would you be willing to share your ideas with us in a short phone interview?

No thanks Yes, please contact me at _____ (phone or email)

Thank you for taking the time to answer these questions at the end of the consult. Your feedback on this service will be vital to help us make improvements.

Completed forms can be scanned and sent by email to:

Kaitlin Atkinson, Researcher, Digital Emergency Medicine - kaitlin.atkinson@ubc.ca

Appendix C: Case Follow-up Interview Protocol

Robson Valley Virtual Medicine

Case Follow up Interview Protocol

Date of Consult: _____ Reason for Consult: _____

Clinician Name/Role/Practice location: _____

Patient Characteristics: _____

Technology Used/type of connection: _____

How many telemedicine sessions have you been involved in since the start of the pilot? _____

1. Describe the case and your role (include patient characteristics, presenting complaint, diagnosis, etc.). What happened? Who was involved in the case?
2. What was the patient outcome?
3. How would you describe the patient/family experience? Did he/she/they provide any feedback?
4. What was your experience? What was your role? What did you do?
5. What were the major learnings that came out of this case? Will anything you have learned impact or change your practice or the way you approach your role?
6. Can you comment on cost impacts for the system (e.g., avoidance of transfer)? For patients (e.g., avoidance of travel, loss of work days)?
7. Without telemedicine, what would you have normally done/what would have happened?
8. What fee code did you use to bill for this session? Was there a suitable fee code? Other comments related to fee codes related to this case?
9. Does this experience make you more favourable/neutral/less favourable of using virtual care for managing your patients? Please explain.
10. Is there anything else about this case that you would like to add?

Thank you for your time!

Appendix D: Provider Interview: Phase 2

Robson Valley Virtual Medicine

Provider Protocol - Retrospective Pre-Post Reflection Interview

Date: _____

Evaluator: _____

Provider/Role: _____

Location of provider: _____

Note that you will be asking the participant to reflect on their views before or at the beginning of the pilot and now.

1. Before or other than this Robson Valley pilot, were you already using any telemedicine/telehealth services? If yes, please describe briefly
2. Think about your expectations about how telemedicine would impact health outcomes in the community. In your view, how has the telemedicine service impacted health outcomes for residents of the Robson Valley/communities? Was the telemedicine service beneficial in supporting your patients' care?

Could you comment on benefits and challenges related to:

Patient experience?

Provider experience?

Cost impact?

3. Thinking back - prior to the start of this pilot, did you expect the telemedicine service would have any impact on collaboration, communication, coordination of care? From your perspective, has the telemedicine service impacted collaboration, communication, coordination of care?
What about relationships among participating providers? Within the community? Between community GPs and emergency physicians at the regional site? Etc.
4. Thinking back, prior to the start of the pilot or as you first got involved, what did you think it would be like to incorporate it into your practice? Your expectations? What challenges did you foresee? How did your expectations prior to the pilot match up with your experience during the pilot?
5. To what extent has the telemedicine service been incorporated into your practice? Comment on any changes to your workflow?
6. From your perspective, what was the most important factor that contributed to the success of the pilot?

7. Can you tell me about something important you have learned from your experience?

8. From your perspective, has your experience with virtual medicine contributed to any changes you've made (to your practice, in the way you approach your role etc.)? What do you think has been the most significant change for you so far?
9. What enablers are contributing to success so far? What factors have proved to be or would be the most important facilitators of uptake of telehealth/telemedicine?
10. What challenges/barriers are being experienced? Despite challenges, would you continue to use telemedicine? Please elaborate/discuss.
11. Have there been interesting or innovative ways that the technologies have been used in the pilot? New ways of using technologies? Unintended innovations? (Probe with Google Glass experience if appropriate)
12. What future technologies would you recommend including? How might new features or technologies be rolled out over time?
13. What recommendations do you have for the future of telemedicine in the region?
14. For the work you're doing with telehealth, do you feel you're being adequately remunerated? Please describe briefly.
 - a. Are there some things current fee codes don't cover/provide?
 - b. In your opinion, are there other ways of being remunerated, without being paid?
15. Is there anything else you would like to add?

Thank-you for taking the time to provide your input!

Appendix E: Brief Report on Remuneration

Executive Summary: Exploring remuneration models for virtual care – What’s working? Where are the gaps? What are the ways forward?

Context

Most physicians in British Columbia (BC) are remunerated for their services by billing through the Medical Services Plan (MSP) using fee codes. BC’s MSP billing system has a number of fee codes to support physicians’ use of real-time virtual care services. However, while technologies are becoming more accessible and a wider variety of media are being used to deliver virtual care (the use of telecommunications and information technology to deliver healthcare from a distance, synonymous with telehealth) in a geographically diverse province, many use cases are not covered under current fee codes.

Issue: Is the current BC fee for service model and available telehealth fee codes, appropriate and adequate to remunerate physicians using virtual care to support their patients?

Digital Emergency Medicine, Rural Coordinating Centre of BC, and a multidisciplinary stakeholder group hosted a strategic discussion with local and international experts on January 23, 2018 to further explore models of remuneration for virtual care services. The discussion was held via videoconference with 15 participants from across BC, Australia and New Zealand, and comprised of general practitioners, emergency physicians, health policy makers, administrators and researchers. The discussion was grounded in the experience of the “real-time virtual support” pilot in the Robson Valley, located in northern BC.

The Robson Valley pilot evaluated the use of digital technologies such as videoconferencing for on demand consultations. These consultations occurred as:

- 1) Family physician or nurse with patient at a rural site to an on-call family physician at a different rural site or at home
- 2) Family physician with patient at a rural site to an emergency physician at a regional site
- 3) Family physician at home to patient at home

Cases in the first category (video link between GP at home, or in her or his office in one community and nurse with patient at the Emergency department or clinic in another community). They ranged from a 38 year old male presenting with severe eczema and cellulitis, a 6 year old child with a rash and fever, a middle aged male with shrapnel wounds from an accidental explosion, to an 80 year old female with a sudden spike in blood pressure.

In the second category (video link between community emergency department to Prince George Emergency Department), cases included intubation of a 70 year old male who presented with COPD, renal failure, and heart failure, emergency cardioversion (74 year old male), an elective cardioversion with conscious sedation (75 year old male), and assessment of chest pain of a 54 year old patient brought in to the toe community emergency department by the RCMP.

The third category (GP connecting directly with patient at home via WebEx) included palliative care follow-up, checking on a patient who had recently suffered a seizure while driving, and treatment of anxiety.

The above clinical use cases that were carried out in the Robson Valley pilot were used to discuss remuneration for virtual care. The discussion explored existing virtual care remuneration models, gaps in current systems, and novel strategies to support this effective form of service delivery.

Objectives of the Discussion

- Support the development of a community of practice committed to delivering high quality, accessible virtual care
- Identify best practices, complexities and challenges in virtual care remuneration within BC's existing remuneration model
- Showcase the power of virtual care to improve patient care, realize savings, be cost effective, and improve access especially for rural and remote communities
- Advance virtual care pilot initiatives to integrate successes in synchrony with ongoing health system evolution such as primary medical homes, primary care network, urgent care models, emergency care, etc.
- Stimulate global collaborations to promote knowledge exchange and best practices in sustainability and continuous quality improvement

This document summarizes key themes and innovative ideas from the discussion.

Theme 1 – Describing the Ideal Future State

The consulting group discussed their “blue sky” visions for virtual care and models of remuneration. The following precepts were generated in the discussion:

- Any one working in any community in an emergency capacity has access to well-trained emergency physicians that are available to respond to and be back up. Virtual care ideally allows this to be available for rural colleagues.
- As virtual care is a tool that contributes to patient-centred care, it is essential to embed it into patient medical home and primary care networks in B.C. This allows a solid assessment of when the “patient needs to be there in person” and when videoconferencing is equivalent or preferable.
- Care should not be driven by billing; as behavior is “heavily influenced by how we’re paid”, a model such as that of the “[UK] national health service” would enable care that is “wrapped around the patient”.
- Flexibility in possible care provision models could open up opportunities for mentorship and collegial consults such as enabling the growing cohort of nearly retired physicians to provide virtual consults and mentorship.

Theme 2 – Benefits of Virtual Care are Well-Established

The benefits of virtual care no longer need to be evaluated. Videoconferencing and other modes of virtual care have already demonstrated tangible benefits for rural communities. Virtual care addresses health care professionals’ unmet sense of isolation, providing collegial collaboration alongside improved access to care.

With proven results, virtual care must now be operationalized, sustained and supported. Improved access to virtual care in rural settings will address immediate health needs of community members who currently struggle to receive timely and high quality care. Additional benefits will follow, including more effective health care spending, improved recruitment and retention of health care professionals, and economic stimulation where business leaders expand into rural locations, knowing timely and quality healthcare is accessible to employees.

To effectively operationalize virtual care, the reliance on virtual care champions must be replaced with policies and standards of care. As part of this process, and to promote physician adoption, this includes establishing a sustainable remuneration model.

Theme 3 – Remuneration in Virtual Care: A Challenge with Opportunities

Fee codes for the remuneration of physicians for virtual care use in BC currently cover a number of use cases; however, there are a number of gaps (see *Appendix 1*). Currently fee codes only cover real-time virtual care, requiring live video interaction with the patient (with few exceptions available to specialists only); thus, “store and forward” models of care are not covered for remuneration. Furthermore, while many specialties have individual codes for telehealth/virtual care consultations, notably Emergency Medicine does not. There are various fee codes covering general practitioners use of virtual care in a variety of situations and additionally there are miscellaneous fee codes scarcely covering virtual care emergencies (for notably less remuneration compared to an in-person consultation) through the specialist services committee for specialists only. As emergencies are inadequately remunerated for emergency physicians, as not all emergency physicians are specialists, and due to the present lack of remuneration; there is a lack of incentive to participate in virtual care as an emergency consultant.

Currently the model for emergency virtual care services is not ideal and poses many challenges to physicians on both the rural consulting and urban consultant side. For example, workload and work flow are problematic, as physicians at the consultant site are asked to manage both incoming virtual care calls and their ongoing consultations *in situ*. Additionally, consultant physicians supporting virtual care calls outside of their regular work hours are not compensated for being on-call, yet must adapt their lifestyle and activities during those times in case they need to answer a call. Outside of the emergency setting, psychiatry has the most robust virtual care fee codes in BC, yet these services are often under-used because of a shortage of consultants to take virtual care calls.

The above examples demonstrate the shortcomings presented by the current fee for service model and whether remuneration for virtual care would truly be improved with additional fee codes. Instead, a different model of remuneration for virtual care may be considered alongside fee for service billing.

Supporting consultant physicians through a salaried system may be a viable option to systemically roll out virtual care throughout the province. However, a salaried model would be more expensive than a fee for service model, requiring additional funds. To make the case to the treasury to provide additional funding would be a challenge, and would require greater utilization rates. Further funding complications arise when patients are located in different health authorities than the consultant physicians, since funding is deployed at district health boards.

A final consideration for future funding model discussions is that corporate entities can easily be incorporated into new models, and therefore policies and criteria pertaining to this funding must be strict enough to ensure the focus of these initiatives is on benefiting patients and not to inadvertently provide opportunities for commercial gain.

Theme 4 – Learning from Other Models

To better understand opportunities and approaches to remuneration of virtual care, other models besides fee for service were explored across jurisdictions, including:

- **Ontario Telehealth Network (OTN):** The OTN allows pre-approved physicians to use in-person fee codes (with small additional payments for technology set-up) for virtual care calls in their fee for service model. This robust system allows flexibility for physicians. With a dedicated virtual

emergency room, dedicated emergency physicians are not on standby and are compensated with the fee for service model.

- **Australia:** Physician remuneration is traditionally a fee for service system that includes some virtual care fee code selections. Additional block funding is also dedicated for programs such as a virtual emergency room that enables other payment schedules for dedicated staff.
- **Medical On-Call Availability Program of BC (MOCAP):** MOCAP compensates physicians who are part of their on-call system with an annual stipend salary in addition to their fee for service billings. Annual salary amounts are higher for physicians who expect to receive fewer calls to compensate for time spent on stand-by without billing for services rendered.
- **Rapid Access to Conductive Expertise of BC (RACE):** RACE is a program that allows primary care physicians to consult specialists via virtual care. Physicians at both ends of the virtual care consultation are compensated via currently available fee codes.
- **BC Poison Control:** BC Poison Control receives block funding from the Provincial Health Services Authority (PHSA), and is paid to physicians strictly as a stipend.
- **Carrier-Sekani Family Services:** Includes a primary care program with dedicated physicians and nurse practitioners that serve the following communities: Takla, Yekooche, Nadleh, Saik'uz, Stelat'en, Nee Tahi Buhn, Cheslatta, Skin Tyee, Burns Lake Band and Wet'suwet'en. Employees of CSFS are contracted and their services include participating in their telehealth program, which provides videoconferencing for patients to meet with professionals.

Theme 5 – Strategies and Considerations for Remuneration

As multiple remuneration models are considered for compensating physicians engaged in virtual care consultations, outcome criteria for the different compensation strategies should be examined. The type of model being supported will reinforce the kind of behaviors being remunerated; thus, it was suggested perhaps the type of behavior you want to support should be established before, and then construct the compensation model around that.

While barriers to different remuneration models need to be examined to guide support, and compensation used to enhance the adoption of virtual care, workload and available time are often cited as greater limiting factors for physicians getting involved in virtual care. For this reason, alternative methods of compensation may need to be explored and trialed. It was suggested that, as time is limited, perhaps we need to consider figuring out how remuneration might occur by giving users more time. Furthermore, it was suggested before change can be addressed, the workflow needs to be characterized, as perhaps remuneration could be in the form of divesting tasks that may not be the best use of physicians' time (e.g., filling out paperwork).

There has also been a call for dedicated staff providing the virtual care service to prevent workload and workflow related issues. It was suggested compensation for this dedicated team be through stipend over remunerating individual encounters. Support for this includes planning and perpetuity of funding required to sustain such a project. Ease of planning finances along with methods of obtaining funding are important factors that also need to be considered when examining remuneration models.

Theme 6 – Scaling and Sustaining

As different remuneration models present different challenges and no one compensation construction can address each of the realities explored here, we may need to consider the adoption of multiple different models where appropriate. This entails exploring fee for service, block-funding/salary-based, and hybrid models. Determining factors of this include structural barriers and crossing jurisdictions; thus, efforts must also be used to standardize the systems and translate this into funding models for sustainment.

It is suggested that if a stream of virtual care services is enabled, demand will be difficult to meet with additional requirements. As an example, in Australia, funding a complete service, which calls upon practitioners from various areas, was found to be the only way the service could be developed as smaller scale projects in the past were not successful. Thus, perhaps there is a call for larger scale operationalization over small projects.

An integral factor in adoption, engagement, and sustaining virtual care services is the commitment of individuals who are passionate about the ability of the service to foster positive outcomes for patients, providers, and the system. “Thoughtful and kind” individuals willing to develop personal relationships will contribute to improved user experiences, an important factor in scaling to new communities.

Priorities and Principles

In summary, participants of the strategic discussion generated the following principles for adapting a robust remuneration model that responds to the needs of rural, emergency virtual care:

- Virtual care is vital to increase access to the underserved to ensure equity is provided
- Cost containment must be considered so virtual care supports productivity and also but not a “runaway cost” and also stems any potential prioritizing of commercial gains
- Virtual care needs the “right people on the bus” who deeply know and understand the context, and are willing to participate and invest the time and energy.
- Alignment with evolving models of care (such as primary care homes) is needed
- A hybrid or mixed model for remuneration may be needed
- Criteria and appropriate approvals must be in place

Concluding Remarks

The benefits of virtual care, particularly for rural patients and providers, are well-documented. Cross-jurisdictional issues and remuneration in an increasingly complex practice environment remain challenges. Knowledge sharing, collaboration and problem-solving among virtual neighbors like Canada, Australia, and New Zealand, who share many similarities, are important to the spread and sustainment of virtual care.

We should also keep in mind that money well spent will save a huge amount of money [for the system]. We can really reduce our budget by using money wisely. It will be bluer skies when you see that you keep recruitment and retention of healthcare providers... in rural communities.

Physician Participant

Appendix F: Use Cases

Video link GP at home; nurse with patient at community clinic/ER	Severe eczema and cellulitis	Used normal, in-person code.
	Ulcer on right cheek/cancer	Used normal, in-person code.
	Ophthalmology - weeping eye	Regular diagnostic fee code.
	Child with rash/fever	Emergency based health care.
	Broken ankle/ snowboard injury	Fee code unknown.
	Shoulder (Braxial plexus) injury	No fee code. There is a fee for outer house call.
	Rapid increase in BP	Salary-based contract.
	Lacerations/ biking accident	Salary-based contract.
	Shrapnel/wounds from accidental explosion	Fee code unknown.
Video link between community clinic/ER and Prince George Emergency Department	Chest pain (brought in by RCMP)	Used normal, in-person code for in-patient visit.
	Diabetic ketoacidosis/ intubation	No particular code for telemedicine – after hours diabetic ketoacidosis.
	Cardioversion	Emergency baseline care. There is a fee code for VC but did not use.
	Elective cardioversion with conscious sedation	N/A
	Intubation (presented w/ COPD, renal failure, heart failure)	N/A
GP and patient connect from home	Anxiety	N/A
	Palliative care follow up	Did not use VC code.
	Checking on patient who had a seizure	N/A