BMJ Open

Rural emergency care 360°: Mobilizing healthcare professionals, decision-makers, patients and citizens to improve rural emergency care in the province of Quebec, Canada: a study protocol

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2017-016039
Article Type:	Protocol
Date Submitted by the Author:	07-Mar-2017
Complete List of Authors:	Fleet, Richard; Université Laval, Département de médecine familiale et de médecine d'urgence Dupuis, Gilles; Université du Québec à Montréal, Fortin, Jean-Paul; Centre integre universitaire de sante et de services sociaux de la Capitale-Nationale Gravel, Jocelyn; SainteJustine Hospital, Emergency Ouimet, Mathieu; University of Laval, Political Science Poitras, Julien; Université Laval, Legare, France; CHU de Quebec and Universite Laval,
Primary Subject Heading:	Emergency medicine
Secondary Subject Heading:	Epidemiology, Health services research
Keywords:	Rural emergency departments,, Health care, Performance, Unwarranted variations in practice

Rural emergency care 360°: Mobilizing healthcare professionals, decision-makers, patients and citizens to improve rural emergency care in the province of Quebec, Canada: a study protocol

Richard Fleet, MD, PhD[1,2], Gilles Dupuis, PhD[3], Jean-Paul Fortin, MD[4], Jocelyn Gravel, MD, MSc[5], Mathieu Ouimet, PhD[6], Julien Poitras, MD[1,2], France Légaré, MD, PhD[7]

[1]Department of Family and Emergency Medicine, Université Laval, Quebec, QC, Canada;

[2]Research Chair in Emergency Medicine, CHAU-Hôtel-Dieu de Lévis (Université Laval); Lévis, QC, Canada;

[3]Department of Psychology, Université du Québec à Montréal, Montreal, QC, Canada ;

[4]Centre intégré universitaire de santé et de services sociaux de la Capitale-Nationale, Québec, Canada ;

[5]CHU Sainte-Justine, Université de Montréal, Montréal, Canada ;

[6]Department of Political Science, Université Laval, Quebec, QC, Canada;

[7]Department of Family Medicine and Emergency Medicine, Knowledge Transfer and Health Technology Assessment Group of the CHU de Québec Research Centre, Unité de Recherche Évaluative, Université Laval, Quebec, QC, Canada.

Corresponding author: Dr. Richard Fleet; CSSS Alphonse-Desjardins Research Centre, Hôtel-Dieu de Lévis, 143 Wolfe Street, Lévis, QC, Canada, G6V 3Z1. Phone: +1 418-835-7121 ext. 3173; Fax: +1 418-835-7276; Email:

rfleet@videotron.ca

Abstract:

Introduction: Emergency departments (EDs) are an important safety net for rural populations. Results of our earlier studies suggest that rural Canadian hospitals have limited access to advanced imaging services and intensive care Units (ICUs) and that patients are transferred over large distances. They also revealed significant geographical variations in rural services. In the absence of national standards, our studies raise questions about inequities in rural access to emergency services and the risks for citizens. Our goal is to build recommendations for improving services by mobilizing stakeholders interested in rural emergency care. With help and full engagement of stakeholders, we will 1) identify solutions for improving quality and performance in rural emergency departments; 2) formulate and prioritize recommendations; 3) transfer knowledge of the recommendations to rural emergency departments and support operationalization ; 4) assess knowledge transfer and explore further impacts of this participatory action research project.

Methodology. We will use a participatory action research approach. We will plan for a governance structure that includes all stakeholder's representatives so throughout this project, stakeholders are fully engaged at every step. Our sample will be 26 emergency departments in rural Quebec. We will conduct semi-structured individual and focus group interviews with relevant and representative participants, including patients and citizens (estimated N=200). Interviews will be thematically analyzed to extract potential solutions and other qualitative information.

An expert panel (±15) will use an analysis grid to develop consensus recommendations from solutions suggested and will evaluate feasibility, impacts, costs, conditions for implementation,

and establish monitoring indicators. Recommendations will be transferred to stakeholders using tailored knowledge translation strategies (web platform, meetings, etc.).

Discussion and expected results. This study will result in a comprehensive consensus list of feasible and high-priority recommendations enabling decision-makers in emergency care to implement improvements in rural emergency care in Quebec.

Ethics and dissemination: This protocol has been approved by the CSSS Alphonse-Desjardins research ethics committee (Project number: MP 2017 - 009).

Strengths of this study

- First research project to mobilize a diverse group of stakeholders to find solutions for improving care and services in Quebec rural emergency departments;
- Consensus on a comprehensive list of feasible and high-priority recommendations for improving the performance of Quebec rural emergency departments;
- Recommendations will be immediately applicable and we will explore their impact by evaluating and monitoring this knowledge mobilization initiative.

Methodological limitation

- Participant selection not –randomized but theoretically representative;
- Time-consuming involvement numerous and busy participants may limit recruitment

Word count: Abstract 317; Main text 2531

Keywords: Rural emergency departments, Health care, Performance, Unwarranted variations in practice, Participatory action research

Introduction

Providing high-quality emergency care in rural areas poses specific challenges that are understudied. Rural emergency departments (EDs) treat four million patients per year in Canada, representing 30% of all emergency consultations, while those living in rural areas are only 20% of the whole population [1-3]. Compared with urban populations, rural populations are older, in poorer health, and more at risk of injury [4-8]. Rural EDs represent an important safety net for rural populations, especially in contexts where there are few alternatives to hospital emergency services, many people are without a family doctor, and recruiting and retaining physicians is difficult [9] . Our previous work showed that access to care and services varies from one part of Canada to another (rural/urban, rural/rural) [3, 10] . In fact, 74% of rural EDs in Quebec have 24/7 access to a general surgeon, ICU and CT scans, elsewhere in the country fewer than 20% of EDs have access to these services[3, 10]. These variations in access to care suggest inequities in accessibility, quality and effectiveness of ED care and services across rural and urban EDs and raise questions about Canada's universal healthcare system. Moreover, in the past decade a wave of centralization of healthcare services has taken place, largely because of budgetary constraints and a shortage of medical personnel. This has led to a reduction of services in rural areas and the closure of several small community hospitals, contributing to the wide variations in practice observed today [2, 11, 12]. In the present context of growing needs and limited resources, policy-makers are reviewing emergency services and their place in the continuum of care. Policy-makers need evidence to inform their choices about allocation of emergency care and services for vulnerable populations in remote areas [2, 13, 14]. In 1997, the Canadian Association of Emergency Physicians (CAEP) made several recommendations about improving medical practice in rural EDs across the country [15]. However, the field of emergency medicine has evolved

significantly over the past 15 years [16] , and an update of these recommendations that is based on recent evidence is needed.

The Quebec Ministry of Health and Social Services (MSSS) published an ED management guide (Guide de gestion de l'urgence, 2000, updated 2006) [17], but it is clear that its use is not widespread in rural EDs[16]. In spite of appeals for change, there is thus a crying need for standards for rural EDs that their managers can turn to[2, 12, 13].

The main objective of this innovative participatory action research project is therefore to address these practice variations and the absence of standards applied in the context of Quebec's rural EDs. In collaboration with more than 200 rural emergency stakeholders and citizens, we plan to co-produce recommendations for improving the performance of EDs that are both evidence-based and respectful of the realities on the ground. Collaboration among stakeholders will identify promising interventions, especially in the continuum of care, based on best evidence and on best practices in similar situations. This process will bring existing solutions to light and adapt them to the realities of rural contexts, increasing likelihood of the implementation of the recommendations.

Potentials solutions for improving accessibility, quality and effectiveness of rural EDs Through our extensive literature review, the results of our earlier research, the expertise of our multidisciplinary team and the experience of our partners we have already identified the following solutions that could improve accessibility, quality and cost-effectiveness in rural emergency care and services: improvement of emergency prehospital care (e.g. optimization of transfers); use of new technologies (e.g. telemedicine, Point of Care Ultrasound (POCUS) ;

optimal use of resources (e.g. access to medical specialists and facilities); training (e.g. simulation-based learning) and improved management procedures (e.g. facilitating the implementation of the ED management guide ("Guide de Gestion de l'urgence"); standardize databases for better measurement of quality indicators).

Improving emergency prehospital care using remote monitoring

The distances between tertiary care hospitals and rural residents limit their access to specialist services and facilities. Our data suggests that most rural EDs are more than 300 km from tertiary and secondary care trauma units, and an average of 300 inter-hospital transfers are required per year in each rural ED [3, 16] . The quality of emergency care in rural areas thus depends on the capacity to perform procedures locally and transfer patients who require it to the nearest referral centre after stabilizing them [18, 19] . This process must be both timely and safe. Inter-hospital transfers, however, are expensive and expose patients to complications (e.g. road accidents) [20, 21]. Moreover, many patients who are in pain or have not been stabilized require a medical or nursing escort, which can cause staff shortages in the emergency room and is very expensive [22]. One promising solution is prehospital remote monitoring, whereby ambulance personnel and nurses can be supported from a distance [23].

Training medical personnel Unlike emergency medicine professionals in urban areas, those in rural areas are proportionally less exposed to various medical situations, including trauma [24], and other serious clinical conditions. In addition, according to our data, one third of rural physicians have less than five years of practice experience and only 6% have had extra emergency medicine training. Rural physicians are requesting this training [25]. Simulation-

based learning or clinical immersion programs are promising innovations in medical education that could meet the educational needs of rural emergency medicine professionals [26, 27].

Quality improvement through standardization

The use of care protocols or guidelines in treating some emergency conditions, such as sepsis [28], strokes [29], cardiovascular problems as well as trauma could improve the quality of care [28, 30]. This would be a relevant and evidence-based approach to reducing practice variations. However, the actual use of care protocols and their impacts on patient-care are unknown, in both rural and urban contexts.

Objectives

The main objectives of this study are therefore to

1) Identify solutions for improving quality and performance in rural emergency departments by mobilise stakeholders (decision-makers, professionals, patients and citizens);

2) Formulate and prioritise recommendations based on solutions identified;

3) Transfer knowledge of recommendations to improve quality and performance in rural EDs and support their operationalisation;

4) Assess knowledge transfer and explore further impacts of the participatory action research project.

Methodology

We chose to use a participatory action research approach for this multipronged project [31]. Our hypothesis is that this process of knowledge co-construction will facilitate implementation of the recommendations.

Selection of EDs and study participants

Participating rural EDs will be the same as in our earlier projects and represent 100% of Quebec rural EDs (N=26). Briefly, these are hospitals that offer 24/7 emergency coverage, including inpatient beds, and are situated in "rural or small towns" according to the Statistics Canada's[32] definition (population more than 10,000 but density of less than 400 people per km2, population less than 10,000 but density of more than 400 people per km2, or population less than 10,000 and density of less than 400 people per km2). Two principles will guide the recruitment of participants: diverse points of view and data saturation [33]. Selection of participants for interviews will also proceed according to these criteria. Respect for representativity of the different types of EDs under study will take precedent over a statistical based representativity in recruiting all players and especially patients/citizens, in keeping with a research approach that emphasizes public involvement [34]. Recruitment will focus on relevant professions/positions. Local media and snowballing will be used for recruitment purposes. In addition, a "champion" will be identified in each rural ED. The champion approach is often used in projects where the researchers are far away from the study site. Champions are people who know the culture of the site and its particular concerns [35, 36]. They will collaborate with the research team throughout the project, especially as recruitment facilitators and knowledge brokers.

Data collection:

Objective 1: Mobilise stakeholders to propose solutions for improving quality and performance in rural EDs

In the first phase of the project, the multiple stakeholders will be invited to participate in semi-structured focus groups [37] or individual interviews [38] to discuss potential solutions for improving accessibility, quality and effectiveness in rural EDs. The interview guide will address topics relating to the particularities of each rural region, the health and social care services available, the current situation of emergency services, the roles of the various emergency professionals, potential solutions for improving services, and barriers and facilitators to implementing these solutions.

Interviews will be planned as follows: a) ± 40 individual interviews with decision makers at all levels or the health system: "Ministère de la Santé et des Services sociaux (MSSS)", regional health and social care centres, local point of care; b) ± four focus groups (± seven participants each), one for each profession identified (physicians, nurses, prehospital emergency services, psychosocial care); c) ± four focus groups with patients and citizens, one for each of the following categories: patient committee members, mayors, community workers, concerned citizens. The number of interviews will be increased until data saturation is reached. They will be led by a research professional with experience in qualitative research and will be recorded and transcribed verbatim.

Thematic analysis of data using N'Vivo software will generate a coding tree (themes and subthemes) of solutions for improving performance in rural EDs. Qualitative information about these solutions (context, feasibility) will also be extracted [39]. The robustness and clarity of the categories will also be assessed through discussion with the research team [40].

Objective 2: Formulate and prioritise recommendations based on solutions identified

In the second phase of the project, the solutions identified through mobilizing stakeholders (Objective 1) will be submitted to a panel of experts. This panel will formulate consensual recommendations based on the solutions extracted and will evaluate their feasibility, impacts, costs and conditions for their implementation. The expert panel (±12) will include members of the research team, academia, university hospitals, professional associations and colleges as well as our rural champions and partners [41].

Selection criteria will be based on peer recognition and individual credibility. This panel will also establish monitoring indicators for implementing the recommendations. The experts will use a multidimensional analysis grid to evaluate each of the solutions identified in Phase 1 using a five-point Likert scale and commenting on each measure. They will assign a priority to each measure based on their assessment of , 1) effectiveness, 2) security or negative externalities, 3) costs, 4) organizational impact (implementation). They will also be asked to comment on the conditions for its implementation and indicate relevant monitoring indicators. Finally, in order to compare solutions, the research team in collaboration with expert panel, will determine the weight of each criteria Ex. Efficiency 30%, Security 30%, Costs, 10%, Organizational impact, 10% VS same weight for all criteria.

Data from this analysis grid will be used to guide discussions during the second expert consultation, which will take place in person during a two-day meeting. Through their deliberations, they will reach a consensus about the priority of the identified solutions and their feasibility, with help from a facilitator with expertise in consensus activities. The consensus recommendations (detailed descriptions, priority, feasibility, cost estimate etc.) will be compiled

in a document that will be the main deliverable at this stage. The document will also mention other suggestions raised during Phase 1 but that were not part of the final consensus.

3) Transfer knowledge of recommendations to improve quality and performance in rural EDs and support their operationalisation

In Phase 3, the knowledge translation phase, the consensus recommendations produced in Phase 2 will be transferred to all the stakeholders involved in suggesting solutions and developing recommendations in Phases 1 and 2. A variety of strategies will be implemented to connect with stakeholders and accompany them in understanding, adapting, and adopting the recommendations. The possible strategies (conferences, videoconferences, websites, social media, communities of practice, etc.) will be defined according to the nature of the recommendations that emerge from the research process and through discussion with our stakeholders (our partners, site champions etc.). We will take care to adapt the knowledge, messages and interventions to the needs of each audience. Our collaborators and co-researchers will all contribute to accompanying the rural sites depending on the needs expressed in each case, in a spirit of fostering partnerships between central and remote locations so that each can understand the situation of the other.

Objective 4: Assess knowledge transfer and explore further impacts of the participatory action research project

We will assess the knowledge transfer and operationalisation in the targeted local sites with a questionnaire validated beforehand that uses a Likert scale followed by open questions. The

survey will assess a) knowledge of the recommendations; b) implementation of solutions to address identified barriers and facilitators; c) intention to adopt proposed solutions d) barriers and facilitators experienced on site by those implementing the recommendations; and e) satisfaction with the project/its relevance.

This online survey will take place at the end of Phase 3 (Period 0), then again five and eight months later. This survey will also enable us to measure the extent of stakeholders' participation in the project and retention rates, and to identify characteristics of sites that adopted (or not) some of the solutions and characteristics of the solutions that had the most impact.

The second part of our evaluation will be an exploratory assessment of the impacts of the changes initiated. Given that adopting recommendations takes time, the real impact of resulting changes on the performance of EDs could occur later, perhaps outside the project timetable. However, we will conduct an exploratory quantitative analysis of the associations between adoption of the recommendations and performance measures in emergency using the indicators determined by the expert panel in Phase 2. These indicators will be based mostly on those of the MSSS, the "Direction des soins urgents, de la traumatologie et du continuum Clinique (DSUTCC)" and the Canadian Institute for Health Information, as well as quality of care indicators proposed by Schull et al. [42], which we validated in earlier studies [43]. Some of the recommendations (training, telemedicine, etc.) may have an immediate impact on certain performance and quality of care indicators, and these will be measured (e.g. number of transfers, duration of transfers, treatment of specific conditions, etc.).

Discussion and expected results

This study is based on a participatory action research approach that fosters the application of scientific knowledge in practice and management [44, 45]. Our research should therefore result in relevant recommendations that are likely to be adopted. The recommendations resulting from this project could be added to a new version of the Quebec emergency management guide (MSSS, 2006) and piloted by the, which is one of the knowledge users in this study. The results are also eagerly awaited by other emergency medicine associations and representatives in other provinces. This research experience, involving large-scale mobilisation, will serve as a model for improving performance in all areas of our health and social care system.

Finally, we will be contributing to the science of knowledge translation. Ours is the only team focusing on mobilising rural communities to contribute to a reflection on rural emergency care. We will document knowledge translation strategies that are effective in this context, which is currently a gap in the literature [46].

Acknowledgements

We wish to thank the rural emergency staff of the province of Québec for participating in our previous study as well of the the "Direction des soins critiques et urgents Ministère de la Santé et des Services sociaux ". We also wish to thank our collaborators : Denise Trudel, Jean-Guy Trottier, Dr Alain Tanguay, Dre Hélène Sylvain, Mr. Daniel Paré, Dr Jean Ouellet, Dr Gilles Lortie, Dr Antoine Groulx, Dr Jean Marc Chauny, Mr. Maxime Laviolette, Mr. Patrice Aubertin, Dr Alex Pool, Dr Jeff Plant , Mr. Louis Luc Beaudoin, Mr. Jean-François Racine and and Mrs Catherine Turgeon-Pelchat.

Competing interests and Funding

The authors declare not having any financial or other conflicts of interest related to the submission. The research project is supported from the "Fonds de Recherche du Québec – Santé (FRQS) " 32825.

Authors Contributors:

RF was responsible for the original idea, literature review and study design. He drafted the initial manuscript and its revised versions. GD, JPF, JG, FL, MO, JP contributed significantly to the manuscript drafting and preparation, revision and formatting the manuscript. RF have contributed to various aspects of the study design with input relating to their specific expertise in the field. All authors read and approved the final manuscript.

References

1. Statistics Canada. Population, urban and rural, by province and territory. Available at: http://www.statcan.gc.ca/tables-tableaux/sumsom/l01/cst01/demo62f-eng.htm. Accessed November 18, 2014.
2. Fleet R, Archambault P, Plant J, Poitras J. Access to emergency care in rural Canada: should we be concerned? Cjem. 2013;15(4):191-3.
3. Fleet R, Poitras J, Maltais-Giguere J, Villa J, Archambault P. A descriptive study of access to services in a random sample of Canadian rural emergency departments. BMJ open. 2013;3(11):e003876.
4. Canadian Institute for Health Information. How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants. Ottawa2006.
5. Fatovich DM, Jacobs IG. The relationship between remoteness and trauma deaths in Western Australia. The Journal of trauma. 2009;67(5):910-4.
6. S L. Rural Canada: Access to health care. Available at: http://publications.gc.ca/Collection-R/LoPBdP/BP/prb0245-e.htm. (Accessed September 26, 2014).
7. Peek-Asa C, Zwerling C, Stallones L. Acute traumatic injuries in rural populations. American journal of public health. 2004;94(10):1689-93.
8. Zakrison T, Ball CG, Kirkpatrick AW. Trauma in Canada: a spirit of equity & collaboration. World journal of surgery. 2013;37(9):2086-93.
9. Gauthier J HJ, Lamarche P, Lévesque JF, Morin D. Entre adaptabilité et fragilité : les conditions d'accès aux services de santé des communautés rurales et éloignées. Institut national de santé publique du Québec 2009.

10. Fleet R, Pelletier C, Marcoux J, et al. Differences in access to services in rural emergency departments of Quebec and Ontario. PloS one. 2015;10(4):e0123746.

11. R C. Is regionalization working? CMAJ. 2010;182(4):331-2.

12. Fleet R, Plant J, Ness R, Moola S. Patient advocacy by rural emergency physicians after major service cuts: the case of Nelson, BC. Canadian journal of rural medicine : the official journal of the Society of Rural Physicians of Canada = Journal canadien de la medecine rurale : le journal officiel de la Societe de medecine rurale du Canada. 2013;18(2):56-61.

13. Romanow RBoV. The Future of Health Care in Canada. [Online, 2002). Available at: http://www.ubcmj.com/pdf/ubcmj_2_2_2011_7-8.pdf (Accessed september 29, 2015).

14. Bilbey N LS. Canadian Health Care: A Focus on Rural Medicine. UBCMJ; 2011. Available at: http://www.ubcmj.com/pdf/ubcmj_2_2_2011_7-8.pdf (Accessed september 29, 2015).

15. Canadian Association of Emergency Physicians. Recommendations for the management of rural, remote and isolated emergency health care facilities in Canada. 1997. Available at: http://caep.ca/resources/position-statements-andguidelines/ management-rural-remote-and-isolated-emergency-health-c (Accesse September 26, 2014).

16. Fleet R, Poitras J, Archambault P, et al. Portrait of rural emergency departments in Quebec and utilization of the provincial emergency department management Guide: cross sectional survey. BMC health services research. 2015;15:572.

17. Ministère De La Santé Et Des Services Sociaux Du Québec. Guide de gestion de l'urgence. Québec: Gouvernement du Québec; 2006.

18. Fleet R, Poitras J. Have we killed the golden hour of trauma? Annals of emergency medicine. 2011;57(1):73-4; author reply 4-5.

19. Rourke JT, Kennard M. Emergency patient transfers from rural hospitals: a regional study. Cjem. 2001;3(4):296-301.

20. Bosk EA, Veinot T, Iwashyna TJ. Which patients and where: a qualitative study of patient transfers from community hospitals. Medical care. 2011;49(6):592-8.

21. Hains IM, Marks A, Georgiou A, Westbrook JI. Non-emergency patient transport: what are the quality and safety issues? A systematic review. International journal for quality in health care : journal of the International Society for Quality in Health Care. 2011;23(1):68-75.

22. Ministère de la santé et des services sociaux. Services préhospitaliers: Urgence d'agir Rapport du Comité national sur les services préhospitaliers d'urgence (2014). Available at: http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2014/14-929-01W.pdf (Accessed october 27, 2015).

23. Charash WE, Caputo MP, Clark H, et al. Telemedicine to a moving ambulance improves outcome after trauma in simulated patients. The Journal of trauma. 2011;71(1):49-54; discussion 5.

24. Waymack JR, Markwell S, Milbrandt JC, Clark TR. Comparison of rates of emergency department procedures and critical diagnoses in metropolitan and rural hospitals. Rural and remote health. 2015;15(4):3298.

25. Drouin MA, Fleet R, Poitras J, et al. The Quebec rural emergency department project: a cross-sectional study of a potential two-pronged strategy in the knowledge transfer process. PloS one. 2015;10(4):e0120523.

26. Agha S, Alhamrani AY, Khan MA. Satisfaction of medical students with simulation based learning. Saudi medical journal. 2015;36(6):731-6.

27. Lateef F. Simulation-based learning: Just like the real thing. Journal of emergencies, trauma, and shock. 2010;3(4):348-52.

28. Kuan WS, Ibrahim I, Leong BS, et al. Emergency Department Management of Sepsis Patients: A Randomized, Goal-Oriented, Noninvasive Sepsis Trial. Annals of emergency medicine. 2016;67(3):367-78.e3.

29. Canadian Stroke Best Practice Recommendations. Hyperacute stroke care (2015). Available at: http://www.strokebestpractices.ca/ (Accessed september 29, 2015).

30. Stewart M, Bledsoe J, Madsen T, et al. Utilization and Safety of a Pulmonary Embolism Treatment Protocol in an Emergency Department Observation Unit. Critical pathways in cardiology. 2015;14(3):87-9.

31. Smith L RL, Schmidt M. Best practices in the reporting of participatory action research: Embracing both the forest and the trees. The Counselling Psychologist. 2010;38(8):1115-1138.

32. Statistique Canada, Definitions of rural. Rural and Small Town Canada Analysis Bulletin. 2001;3(3):1- 17.

33. L S-Z. Comment peut-on construire un échantillonnage scientifiquement valide? Recherches Qualitatives; 2007(5):99-111.

34. Boivin A, Lehoux P, Burgers J, Grol R. What are the key ingredients for effective public involvement in health care improvement and policy decisions? A randomized trial process evaluation. The Milbank quarterly. 2014;92(2):319-50.

35. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation science : IS. 2009;4:50.

36. MacDougall C, Fudge E. Planning and recruiting the sample for focus groups and in-depth interviews. Qualitative health research. 2001;11(1):117-26.

37. Morgan DLaRAK. The Focus Group Kit (six book set). Thousand Oaks, Calif: Sage. 1998.

38. Savoie-Zajc L. L'entrevue semi-dirigée. Dans B. Gauthier (Dir.) : Recherche sociale : de la problématique à la collecte de données (5e édition). Québec, Québec : Presses de l'Université du Québec. 2009.

39. Paillé P, & Mucchielli, A. L'analyse qualitative en sciences humaines et sociales. Armand Colin. 2012.

40. Thomas D. A General Inductive Approach for Analyzing Qualitative Evaluation Data. 2006; 27 (2): 237-246.

41. Jones J, Hunter D. Consensus methods for medical and health services research. BMJ (Clinical research ed). 1995;311(7001):376-80.

42. Schull MJ HC, Guttmann A, Leaver CA, Vermeulen M, Rowe BH, Anderson GM, Zwarenstein M. . Development of a Consensus on Evidence-Based Quality of Care Indicators for Canadian Emergency Departments. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences; 2010.

43. Layani G, Fleet R, Dallaire R, et al. The challenges of measuring quality-of-care indicators in rural emergency departments: a cross-sectional descriptive study. CMAJ open. 2016;4(3):E398-e403.

44. Israel BA, Schulz AJ, Parker EA, Becker AB. Review of community-based research: assessing partnership approaches to improve public health. Annual review of public health. 1998;19:173-202.

45. Jagosh J, Macaulay AC, Pluye P, et al. Uncovering the benefits of participatory research: implications of a realist review for health research and practice. The Milbank quarterly. 2012;90(2):311-46.

46. Parsons JE, Merlin TL, Taylor JE, Wilkinson D, Hiller JE. Evidence-based practice in rural and remote clinical practice: where is the evidence? The Australian journal of rural health. 2003;11(5):242-8.

BMJ Open

Rural emergency care 360°: Mobilizing healthcare professionals, decision-makers, patients and citizens to improve rural emergency care in the province of Quebec, Canada: a qualitative study protocol

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2017-016039.R1
Article Type:	Protocol
Date Submitted by the Author:	26-Apr-2017
Complete List of Authors:	Fleet, Richard; Université Laval, Département de médecine familiale et de médecine d'urgence Dupuis, Gilles; Université du Québec à Montréal, Fortin, Jean-Paul; Centre integre universitaire de sante et de services sociaux de la Capitale-Nationale Gravel, Jocelyn; SainteJustine Hospital, Emergency Ouimet, Mathieu; University of Laval, Political Science Poitras, Julien; Université Laval, Legare, France; CHU de Quebec and Universite Laval,
Primary Subject Heading:	Emergency medicine
Secondary Subject Heading:	Health services research, Medical management, Qualitative research
Keywords:	Rural emergency departments,, Health care, Performance, Unwarranted variations in practice

Rural emergency care 360°: Mobilizing healthcare professionals, decision-makers, patients and citizens to improve rural emergency care in the province of Quebec, Canada: a qualitative study protocol

Richard Fleet, MD, PhD[1,2], Gilles Dupuis, PhD[3], Jean-Paul Fortin, MD[4], Jocelyn Gravel, MD, MSc[5], Mathieu Ouimet, PhD[6], Julien Poitras, MD[1,2], France Légaré, MD, PhD[7]

[1]Department of Family and Emergency Medicine, Université Laval, Quebec, QC, Canada;

[2]Research Chair in Emergency Medicine, CHAU-Hôtel-Dieu de Lévis (Université Laval); Lévis, QC, Canada;

[3]Department of Psychology, Université du Québec à Montréal, Montreal, QC, Canada ;

[4]Centre intégré universitaire de santé et de services sociaux de la Capitale-Nationale, Québec, Canada ;

[5]CHU Sainte-Justine, Université de Montréal, Montréal, Canada ;

[6]Department of Political Science, Université Laval, Quebec, QC, Canada;

[7]Department of Family Medicine and Emergency Medicine, Knowledge Transfer and Health Technology Assessment Group of the CHU de Québec Research Centre, Unité de Recherche Évaluative, Université Laval, Quebec, QC, Canada.

Corresponding author: Dr. Richard Fleet; CSSS Alphonse-Desjardins Research Centre, Hôtel-Dieu de Lévis, 143 Wolfe Street, Lévis, QC, Canada, G6V 3Z1. Phone: +1 418-835-7121 ext. 3173; Fax: +1 418-835-7276; Email: rfleet@videotron.ca

Abstract:

Introduction: Emergency departments (EDs) are an important safety net for rural populations. Results of our earlier studies suggest that rural Canadian hospitals have limited access to advanced imaging services and intensive care Units (ICUs) and that patients are transferred over large distances. They also revealed significant geographical variations in rural services. In the absence of national standards, our studies raise questions about inequities in rural access to emergency services and the risks for citizens. Our goal is to build recommendations for improving services by mobilizing stakeholders interested in rural emergency care. With help and full engagement of stakeholders, we will 1) identify solutions for improving quality and performance in rural emergency departments; 2) formulate and prioritize recommendations; 3) transfer knowledge of the recommendations to rural emergency departments and support operationalization; 4) assess knowledge transfer and explore further impacts of this participatory action research project.

Methodology: We will use a participatory action research approach. We will plan for a governance structure that includes all stakeholders' representatives so throughout this project, stakeholders are fully engaged at every step. Our sample will be 26 emergency departments in rural Quebec. We will conduct semi-structured individual and focus group interviews with relevant and representative participants, including patients and citizens (estimated N=200). Interviews will be thematically analyzed to extract potential solutions and other qualitative information.

An expert panel (±15) will use an analysis grid to develop consensus recommendations from solutions suggested and will evaluate feasibility, impacts, costs, conditions for implementation,

and establish monitoring indicators. Recommendations will be transferred to stakeholders using tailored knowledge translation strategies (web platform, meetings, etc.).

Discussion and expected results: This study will result in a comprehensive consensus list of feasible and high-priority recommendations enabling decision-makers in emergency care to implement improvements in rural emergency care in Quebec.

Ethics and dissemination: This protocol has been approved by the CSSS Alphonse-Desjardins research ethics committee (Project number: MP 2017 - 009).

Strengths of this study:

- First research project to mobilize a diverse group of stakeholders to find solutions for improving care and services in Quebec rural emergency departments;
- Consensus on a comprehensive list of feasible and high-priority recommendations for improving the performance of Quebec rural emergency departments;
- Recommendations will be immediately applicable and we will explore their impact by evaluating and monitoring this knowledge mobilization initiative.

Methodological limitation:

- Participant selection not –randomized but theoretically representative;
- Interviews and committee participation is time-consuming and participants with busy schedules may decline participation or may not continue to the end of the study.

Word count: Abstract 295; Main text 2750

Keywords: Rural emergency departments, Health care, Performance, Unwarranted variations in practice, Participatory action research

Introduction

Providing high-quality emergency care in rural areas poses specific challenges that are understudied. Rural emergency departments (EDs) treat four million patients per year in Canada, representing 30% of all emergency consultations, while those living in rural areas are only 20% of the whole population (1-3). Compared with urban populations, rural populations are older, in poorer health, and more at risk of injury (4-8). Rural EDs represent an important safety net for rural populations, especially in contexts where there are few alternatives to hospital emergency services, many people are without a family doctor, and recruiting and retaining physicians is difficult (9). Our previous work showed that access to care and services varies from one part of Canada to another (rural/urban, rural/rural) (3, 10). In fact, 74% of rural EDs in Quebec have 24/7 access to a general surgeon, ICU and CT scans, elsewhere in the country fewer than 20% of EDs have access to these services (3, 10). These variations in access to care suggest inequities in accessibility, quality and effectiveness of ED care and services across rural and urban EDs and raise questions about Canada's universal healthcare system. Moreover, in the past decade a wave of centralization of healthcare services has taken place, largely because of budgetary constraints and a shortage of medical personnel. This has led to a reduction of services in rural areas and the closure of several small community hospitals, contributing to the wide variations in practice observed today (2, 11, 12). In the present context of growing needs and limited resources, policy-makers are reviewing emergency services and their place in the continuum of care. Policy-makers need evidence to inform their choices about allocation of emergency care and services for vulnerable populations in remote areas (2, 13, 14). In 1997, the Canadian Association of Emergency Physicians (CAEP) made several recommendations about improving medical practice in rural EDs across the country (15). However, the field of emergency medicine has evolved

significantly over the past 15 years (16), and an update of these recommendations that is based on recent evidence is needed.

The Quebec Ministry of Health and Social Services (MSSS) published an ED management guide (Guide de gestion de l'urgence, 2000, updated 2006) (17), but it is clear that its use is not widespread in rural EDs (16). In spite of appeals for change, there is thus an urgent need for standards for rural EDs that managers of these EDs can turn to (2, 12, 13).

The main objective of this innovative participatory action research project is therefore to address these practice variations and the absence of standards applied in the context of Quebec's rural EDs. In collaboration with more than 200 rural emergency stakeholders and citizens, we plan to co-produce recommendations for improving the performance of EDs that are both evidence-based and respectful of the constraints of real world concerns. Collaboration among stakeholders will identify promising interventions, especially in the continuum of care, based on best evidence and on best practices in similar situations. This process will bring existing solutions to light and adapt them to the realities of rural contexts, increasing likelihood of the implementation of the recommendations.

Potentials solutions for improving accessibility, quality and effectiveness of rural EDs

Through our literature review and the results of our earlier research, the expertise of our multidisciplinary team and the experience of our partners we have already identified the following solutions that could improve accessibility, quality and cost-effectiveness in rural emergency care and services: improvement of emergency prehospital care (e.g. optimization of transfers); use of new technologies (e.g. telemedicine, Point of Care Ultrasound (POCUS));

optimal use of resources (e.g. access to medical specialists and facilities); training (e.g. simulation-based learning) and improved management procedures (e.g. facilitating the implementation of the ED management guide ("Guide de gestion de l'urgence"); standardize databases for better measurement of quality indicators). These solutions will be proposed to participants of our study in order to validate the potential usefulness and applicability.

Improving emergency prehospital care using remote monitoring

The distances between tertiary care hospitals and rural residents limit their access to specialist services and facilities. Our data suggests that most rural EDs are more than 300 km from tertiary and secondary care trauma units, and an average of 300 inter-hospital transfers are required per year in each rural ED (3, 16). The quality of emergency care in rural areas thus depends on the capacity to perform procedures locally and transfer patients who require it to the nearest referral centre after stabilizing them (18, 19). This process must be both timely and safe. Inter-hospital transfers, however, are expensive and expose patients to complications (e.g. road accidents) (20, 21). Moreover, many patients who are in pain or have not been stabilized require a medical or nursing escort, which can cause staff shortages in the emergency room and is very expensive (22). One promising solution is prehospital remote monitoring, whereby ambulance personnel and nurses can be supported from a distance (23).

Training medical personnel

Unlike emergency medicine professionals in urban areas, those in rural areas are proportionally less exposed to various medical situations, including managing trauma related injuries (24), and other serious clinical conditions. In addition, according to our data, one third of rural physicians have less than five years of practice experience and only 6% have had extra emergency medicine

training – CCFP (EM) Canadian College of Family Medicine certification of special competency in emergency medicine (total of 3 years post-graduate (MD) training), or Fellowship of the Royal College of Physicians speciality in emergency medicine (FRCP) (5 years post-graduate (MD) training. Rural physicians are requesting additional training (25). Simulation-based learning or clinical immersion programs are promising innovations in medical education that could meet the educational needs of rural emergency medicine professionals (26, 27).

Quality improvement through standardization

The use of care protocols or guidelines in treating some emergency conditions, such as sepsis (28), strokes (29), cardiovascular problems as well as trauma could improve the quality of care (28, 30). This would be a relevant and evidence-based approach to reducing practice variations. However, the actual use of care protocols in both rural and urban contexts and their respective impacts on patient-care and health are unknown.

Objectives

The main objectives of this study are therefore to:

1) Identify solutions for improving quality and performance in rural emergency departments by mobilizing stakeholders (decision-makers, professionals, patients and citizens);

2) Formulate and prioritize recommendations based on solutions identified;

3) Transfer knowledge of recommendations to improve quality and performance in rural EDs and support the implementation of the recommendations and identified solutions;

4) Assess knowledge transfer and explore further impacts of the participatory action research project.

Methodology

We chose to use a participatory action research approach for this multipronged project (31). Our hypothesis is that this process of knowledge co-construction will facilitate implementation of the recommendations.

Selection of EDs and study participants

Participating rural EDs will mostly be the same as in our earlier projects and represent 100% of Quebec rural EDs (N=26). Ongoing changes, including mergers, in the Quebec hospital system may slightly affect our selection criteria at the time of the study's onset. Briefly, these are hospitals that offer 24/7 emergency coverage, including inpatient beds, and are situated in "rural or small towns" according to the Statistics Canada's (32) definition (population more than 10,000 but density of less than 400 people per km2, population less than 10,000 but density of more than 400 people per km2, or population less than 10,000 and density of less than 400 people per km2 (we are revising as per changes in recent census). Two principles will guide the recruitment of participants: participant's characteristics which are susceptible to give rise to different viewpoints (e.g. years of experience, shift work, profession, etc.) and data saturation (33). Respect for representativity of the different types of EDs under study will take precedent over a statistically-based representativity in recruiting all stakeholders. Patient/citizens selection, will follow a research approach that emphasizes public involvement (34). For health care professionals, recruitment will focus on relevant professions/positions best suited to answer our ED specific questions: physicians, nurses, head nurses, administrators, diagnostic technicians, laboratory technicians, psychosocial professionals, pre-hospital emergency professionals. Local media and snowballing will be used for recruitment purposes. In addition, a "champion" will be identified in each rural ED. The criteria for the recruitment of the champions go as follow: 1) the champions

must by familiar with the ED and, 2) they may occupy any function as long as they have good knowledge of the ED and its staff. The champion approach is often used in projects where the researchers are far away from the study site. Champions are people who know the culture of the site and its particular concerns (35, 36). They will collaborate with the research team throughout the project, especially as recruitment facilitators and knowledge brokers.

Data collection:

Objective 1: Mobilize stakeholders to propose solutions for improving quality and performance in rural EDs

In the first phase of the project, the multiple stakeholders will be invited to participate in semi-structured focus groups (37) or individual interviews (38) to discuss potential solutions for improving accessibility, quality and effectiveness in rural EDs. The interview guide will address topics relating to the particularities of each rural region (e.g. the health and social care services available, the current situation of emergency services, the roles of the various emergency professionals, potential solutions for improving services, and barriers and facilitators to implementing these solutions).

Interviews will be planned as follows: a) ± 40 individual interviews with decision makers at all levels or the health system: "Ministère de la Santé et des Services sociaux (MSSS)", regional health and social care centres, local point of care; b) ± four focus groups (± seven participants each), one for each profession identified (physicians, nurses, prehospital emergency services, psychosocial care); c) ± four focus groups with patients and citizens, one for each of the following categories: patient committee members, mayors, community workers, concerned

citizens. The number of interviews will be increased until data saturation is reached. They will be led by a research professional with experience in qualitative research and will be recorded and transcribed verbatim.

Thematic analysis of data using NVivo software will generate a coding tree (themes and subthemes) of solutions for improving performance in rural EDs. Qualitative information about these solutions (context, feasibility) will also be extracted (39). The robustness and clarity of the categories will also be assessed through discussion with the research team (40).

Objective 2: Formulate and prioritize recommendations based on solutions identified

In the second phase of the project, the solutions identified through mobilizing stakeholders (Objective 1) will be submitted to a panel of experts. This panel will formulate consensual recommendations based on the solutions extracted and will evaluate their feasibility, impacts, costs and conditions for their implementation. The expert panel (±12) will include members of the research team, academia, university hospitals, professional associations and colleges as well as our rural champions and partners (41). Selection criteria will be based on peer recognition and individual credibility. This panel will also establish monitoring indicators for implementing the recommendations.

A two-phase process will be used to establish the consensual recommendations. First, an anonymous by Email process will be implemented and, second, a nominal face-to-face process will be used to generate those consensual recommendations.

The anonymous by Email process will use a multidimensional analysis grid that will be sent to the experts so that they will be able to evaluate each of the solutions identified in Phase 1 of the study. The data collection tool will contain a five-point Likert scale used to rate the solutions and open-ended spaces to comment on each measure. They will assign a priority to each measure based on their assessment of, 1) effectiveness, 2) security or negative externalities, 3) costs, 4) organizational impact (implementation). They will also be asked to comment on the conditions for its implementation and indicate relevant monitoring indicators. Finally, in order to compare solutions, the research team in collaboration with the expert panel will determine the weight of each criteria (e.g. Efficiency 30%, Security 30%, Costs 20%, Organizational impact 20%).

Data from this analysis grid will be used to guide discussions during the second face-to-face nominal process with the experts which will take place in person during a two-day meeting. Through this nominal process, they will reach a consensus about the priority of the identified solutions and their feasibility, with help from a facilitator with expertise in consensus activities. The consensus recommendations (detailed descriptions, priority, feasibility, cost estimates, etc.) will be compiled in a document that will be the main deliverable at this stage. The document will also mention other suggestions raised during Phase 1 but that were not part of the final consensus.

Objective 3: Transfer knowledge of recommendations to improve quality and performance in rural EDs and support their implementation

In Phase 3, the knowledge translation phase, the consensus recommendations produced in Phase 2 will be transferred to all the stakeholders involved in suggesting solutions and developing

recommendations in Phases 1 and 2. A variety of strategies will be implemented to connect with stakeholders and accompany them in understanding, adapting, and adopting the recommendations. The possible strategies (conferences, videoconferences, websites, social media, communities of practice, etc.) will be defined according to the nature of the recommendations that emerge from the research process and through discussion with our stakeholders (our partners, site champions, etc.). We will take care to adapt the knowledge, messages and interventions to the needs of each audience. Our collaborators and co-researchers will all contribute to accompanying the rural sites depending on the needs expressed in each case, in a spirit of fostering partnerships between central and remote locations so that each can understand the situation of the other.

Objective 4: Assess knowledge transfer and explore further impacts of the participatory action research project

We will assess the knowledge transfer and implementation in the targeted local sites with a questionnaire validated beforehand that uses a Likert scale followed by open questions. The survey will assess a) knowledge of the recommendations; b) implementation of solutions to address identified barriers and facilitators; c) intention to adopt proposed solutions; d) barriers and facilitators experienced on site by those implementing the recommendations; and e) satisfaction with the project/its relevance.

This online survey will take place at the end of Phase 3 (Period 0), then again five and eight months later. This survey will also enable us to measure the extent of stakeholders' participation

in the project and retention rates, and to identify characteristics of sites that adopted (or not) some of the solutions and characteristics of the solutions that had the most impact.

The second part of our evaluation will be an exploratory assessment of the impacts of the changes initiated. Given that adopting recommendations takes time, the real impact of resulting changes on the performance of EDs could occur later, perhaps outside the project timetable. However, we will conduct an exploratory quantitative analysis of the associations between adoption of the recommendations and performance measures in emergency using the indicators determined by the expert panel in Phase 2. These indicators will be based mostly on those of the MSSS, the "Direction des soins urgents, de la traumatologie et du continuum clinique (DSUTCC)" and the Canadian Institute for Health Information, as well as quality of care indicators proposed by Schull et al. (42), which we validated in earlier studies (43). Some of the recommendations (training, telemedicine, etc.) may have an immediate impact on certain performance and quality of care indicators, and these will be measured (e.g. number of transfers, duration of transfers, treatment of specific conditions, etc.).

Discussion and expected results

This study is based on a participatory action research approach that fosters the application of scientific knowledge in practice and management (44, 45). Our research should therefore result in relevant recommendations that are likely to be adopted. The recommendations resulting from this project could be added to a new version of the Quebec emergency management guide (MSSS, 2006) and piloted by the DSUTCC, which is one of the knowledge users in this study. The results are also eagerly awaited by other emergency medicine associations and representatives in other

provinces. This research experience, involving large-scale mobilization, will hopefully serve as a model for improving performance in all areas of our health and social care system.

Finally, we will be contributing to the science of knowledge translation. We will document knowledge translation strategies that are effective in this context, which is currently a gap in the literature (46).

Acknowledgements

We wish to thank the rural emergency staff of the province of Québec for participating in our previous study as well of the "Direction des soins critiques et urgents Ministère de la Santé et des Services sociaux". We also wish to thank our collaborators : Denise Trudel, Jean-Guy Trottier, Dr Alain Tanguay, Mme Hélène Sylvain, Mr. Daniel Paré, Dr Jean Ouellet, Dr Gilles Lortie, Dr Antoine Groulx, Dr Jean Marc Chauny, Mr. Maxime Laviolette, Mr. Patrice Aubertin, Dr Alex Pool, Dr Jeff Plant, Mr. Louis Luc Beaudoin, Mr. Jean-François Racine and Mrs Catherine Turgeon-Pelchat.

Competing interests and Funding

The authors declare not having any financial or other conflicts of interest related to the submission. The research project is supported from the "Fonds de Recherche du Québec – Santé (FRQS) " 32825.

Authors Contributors:

RF was responsible for the original idea, literature review and study design. He drafted the initial manuscript and its revised versions. GD, JPF, JG, FL, MO, JP contributed significantly to the manuscript drafting and preparation, revision and formatting the manuscript. RF has contributed to various aspects of the study design with input relating to their specific expertise in the field. All authors read and approved the final manuscript.

References

1. Statistics Canada. Population, urban and rural, by province and territory. Available at: http://www.statcan.gc.ca/tables-tableaux/sumsom/l01/cst01/demo62f-eng.htm. Accessed November 18, 2014.
2. Fleet R, Archambault P, Plant J, Poitras J. Access to emergency care in rural Canada: should we be concerned? Cjem. 2013;15(4):191-3.
3. Fleet R, Poitras J, Maltais-Giguere J, Villa J, Archambault P. A descriptive study of access to services in a random sample of Canadian rural emergency departments. BMJ Open. 2013;3(11):e003876.
4. Canadian Institute for Health Information. How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants. Ottawa2006.
5. Fatovich DM, Jacobs IG. The relationship between remoteness and trauma deaths in Western Australia. J Trauma. 2009;67(5):910-4.
6. S L. Rural Canada: Access to health care. Available at: http://publications.gc.ca/Collection-R/LoPBdP/BP/prb0245-e.htm. (Accessed September 26, 2014).
7. Peek-Asa C, Zwerling C, Stallones L. Acute traumatic injuries in rural populations. Am J Public Health. 2004;94(10):1689-93.
8. Zakrison T, Ball CG, Kirkpatrick AW. Trauma in Canada: a spirit of equity & collaboration. World J Surg. 2013;37(9):2086-93.
9. Gauthier J HJ, Lamarche P, Lévesque JF, Morin D. Entre adaptabilité et fragilité : les conditions d'accès aux services de santé des communautés rurales et éloignées. Institut national de santé publique du Québec 2009.
10. Fleet R, Pelletier C, Marcoux J, Maltais-Giguere J, Archambault P, Audette LD, et al. Differences in access to services in rural emergency departments of Quebec and Ontario. PLoS One. 2015;10(4):e0123746.
11. R C. Is regionalization working? CMAJ. 2010;182(4):331-2.
12. Fleet R, Plant J, Ness R, Moola S. Patient advocacy by rural emergency physicians after major service cuts: the case of Nelson, BC. Can J Rural Med. 2013;18(2):56-61.
13. Romanow RBoV. The Future of Health Care in Canada. [Online, 2002). Available at: http://www.ubcmj.com/pdf/ubcmj_2_2_2011_7-8.pdf (Accessed september 29, 2015).
14. Bilbey N LS. Canadian Health Care: A Focus on Rural Medicine. UBCMJ; 2011. Available at: http://www.ubcmj.com/pdf/ubcmj_2_2_2011_7-8.pdf (Accessed september 29, 2015).
15. Canadian Association of Emergency Physicians. Recommendations for the management of rural, remote and isolated emergency health care facilities in Canada. 1997. Available at: http://caep.ca/resources/position-statements-andguidelines/ management-rural-remote-and-isolated-emergency-health-c (Accesse September 26, 2014).
16. Fleet R, Poitras J, Archambault P, Tounkara FK, Chauny JM, Ouimet M, et al. Portrait of rural emergency departments in Quebec and utilization of the provincial emergency department management Guide: cross sectional survey. BMC Health Serv Res. 2015;15:572.

17. Ministère De La Santé Et Des Services Sociaux Du Québec. Guide de gestion de l'urgence. Québec: Gouvernement du Québec; 2006.

18. Fleet R, Poitras J. Have we killed the golden hour of trauma? Ann Emerg Med. 2011;57(1):73-4; author reply 4-5.

19. Rourke JT, Kennard M. Emergency patient transfers from rural hospitals: a regional study. Cjem. 2001;3(4):296-301.

20. Bosk EA, Veinot T, Iwashyna TJ. Which patients and where: a qualitative study of patient transfers from community hospitals. Med Care. 2011;49(6):592-8.

21. Hains IM, Marks A, Georgiou A, Westbrook JI. Non-emergency patient transport: what are the quality and safety issues? A systematic review. Int J Qual Health Care. 2011;23(1):68-75.

22. Ministère de la santé et des services sociaux. Services préhospitaliers: Urgence d'agir Rapport du Comité national sur les services préhospitaliers d'urgence (2014). Available at: http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2014/14-929-01W.pdf (Accessed october 27, 2015).

23. Charash WE, Caputo MP, Clark H, Callas PW, Rogers FB, Crookes BA, et al. Telemedicine to a moving ambulance improves outcome after trauma in simulated patients. J Trauma. 2011;71(1):49-54; discussion 5.

24. Waymack JR, Markwell S, Milbrandt JC, Clark TR. Comparison of rates of emergency department procedures and critical diagnoses in metropolitan and rural hospitals. Rural Remote Health. 2015;15(4):3298.

25. Drouin MA, Fleet R, Poitras J, Archambault P, Chauny JM, Levesque JF, et al. The Quebec rural emergency department project: a cross-sectional study of a potential two-pronged strategy in the knowledge transfer process. PLoS One. 2015;10(4):e0120523.

26. Agha S, Alhamrani AY, Khan MA. Satisfaction of medical students with simulation based learning. Saudi Med J. 2015;36(6):731-6.

27. Lateef F. Simulation-based learning: Just like the real thing. J Emerg Trauma Shock. 2010;3(4):348-52.

28. Kuan WS, Ibrahim I, Leong BS, Jain S, Lu Q, Cheung YB, et al. Emergency Department Management of Sepsis Patients: A Randomized, Goal-Oriented, Noninvasive Sepsis Trial. Ann Emerg Med. 2016;67(3):367-78.e3.

29. Canadian Stroke Best Practice Recommendations. Hyperacute stroke care (2015). Available at: http://www.strokebestpractices.ca/ (Accessed september 29, 2015).

30. Stewart M, Bledsoe J, Madsen T, Sturges Z, McGuire T, Rayner T, et al. Utilization and Safety of a Pulmonary Embolism Treatment Protocol in an Emergency Department Observation Unit. Crit Pathw Cardiol. 2015;14(3):87-9.

31. Smith L RL, Schmidt M. Best practices in the reporting of participatory action research: Embracing both the forest and the trees. The Counselling Psychologist. 2010;38(8):1115-1138.

32. Statistique Canada, Definitions of rural. Rural and Small Town Canada Analysis Bulletin. 2001;3(3):1- 17.

33. Savoie-Zajc L. Comment peut-on construire un échantillonnage scientifiquement valide? Recherches Qualitatives; 2007(5):99-111.
34. Boivin A, Lehoux P, Burgers J, Grol R. What are the key ingredients for effective public involvement in health care improvement and policy decisions? A randomized trial process evaluation. Milbank Q. 2014;92(2):319-50.
35. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci. 2009;4:50.
36. MacDougall C, Fudge E. Planning and recruiting the sample for focus groups and in-depth interviews. Qual Health Res. 2001;11(1):117-26.
37. Morgan DLaRAK. The Focus Group Kit (six book set). Thousand Oaks, Calif: Sage. 1998.
38. Savoie-Zajc L. L'entrevue semi-dirigée. Dans B. Gauthier (Dir.) : Recherche sociale : de la problématique à la collecte de données (5e édition). Québec, Québec : Presses de l'Université du Québec. 2009.
39. Paillé P, & Mucchielli, A. L'analyse qualitative en sciences humaines et sociales. Armand Colin. 2012.
40. Thomas D. A General Inductive Approach for Analyzing Qualitative Evaluation Data. 2006; 27 (2): 237-246.
41. Jones J, Hunter D. Consensus methods for medical and health services research. Bmj. 1995;311(7001):376-80.
42. Schull MJ HC, Guttmann A, Leaver CA, Vermeulen M, Rowe BH, Anderson GM, Zwarenstein M. . Development of a Consensus on Evidence-Based Quality of Care Indicators for Canadian Emergency Departments. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences; 2010.
43. Layani G, Fleet R, Dallaire R, Tounkara FK, Poitras J, Archambault P, et al. The challenges of measuring quality-of-care indicators in rural emergency departments: a cross-sectional descriptive study. CMAJ Open. 2016;4(3):E398-e403.
44. Israel BA, Schulz AJ, Parker EA, Becker AB. Review of community-based research: assessing partnership approaches to improve public health. Annu Rev Public Health. 1998;19:173-202.
45. Jagosh J, Macaulay AC, Pluye P, Salsberg J, Bush PL, Henderson J, et al. Uncovering the benefits of participatory research: implications of a realist review for health research and practice. Milbank Q. 2012;90(2):311-46.
46. Parsons JE, Merlin TL, Taylor JE, Wilkinson D, Hiller JE. Evidence-based practice in rural and remote clinical practice: where is the evidence? Aust J Rural Health. 2003;11(5):242-8.

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract *In the title and in the abstract*
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found *The study protocol is defined pages 3 - 4*
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported *Pages 6 - 7*
Objectives	3	State specific objectives, including any prespecified hypotheses *Page 7*
Methods		
Study design	4	Present key elements of study design early in the paper *Page 9*
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection *Pages 10 - 11*
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Pages 10 - 11*
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed *NA (Qualitative study)*
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable *Pages 11 -13*
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group *Pages 11 - 12*
Bias	9	Describe any efforts to address potential sources of bias *Pages 12 - 13*
Study size	10	Explain how the study size was arrived at *Pages 11 - 13*
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why *NA*
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding *NA (Qualitative study)*
		(*b*) Describe any methods used to examine subgroups and interactions *NA (Qualitative study)*
		(*c*) Explain how missing data were addressed *NA (Qualitative study)*
		(*d*) If applicable, explain how loss to follow-up was addressed *NA (Qualitative study)*
		(*e*) Describe any sensitivity analyses *NA (Qualitative study)*

Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed *NA (Study protocol)*
		(b) Give reasons for non-participation at each stage *NA (Study protocol)*
		(c) Consider use of a flow diagram *NA (Study protocol)*
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders *NA (Study protocol)*
		(b) Indicate number of participants with missing data for each variable of interest *NA (Study protocol)*
		(c) Summarise follow-up time (eg, average and total amount) *NA (Study protocol)*
Outcome data	15*	Report numbers of outcome events or summary measures over time *NA (Study protocol)*
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included *NA (Study protocol)*
		(*b*) Report category boundaries when continuous variables were categorized *NA (Study protocol)*
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period *NA (Study protocol)*
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses *NA (Study protocol)*
Discussion		
Key results	18	Summarise key results with reference to study objectives *NA (Study protocol)*
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias *NA (Study protocol)*
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence *NA (Study protocol)*
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based *NA (Study protocol) This information will be reported in the article*

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

BMJ Open

Rural emergency care 360°: Mobilizing healthcare professionals, decision-makers, patients and citizens to improve rural emergency care in the province of Quebec, Canada: a qualitative study protocol

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2017-016039.R2
Article Type:	Protocol
Date Submitted by the Author:	09-Jun-2017
Complete List of Authors:	Fleet, Richard; Université Laval, Département de médecine familiale et de médecine d'urgence Dupuis, Gilles; Université du Québec à Montréal, Fortin, Jean-Paul; Centre integre universitaire de sante et de services sociaux de la Capitale-Nationale Gravel, Jocelyn; SainteJustine Hospital, Emergency Ouimet, Mathieu; University of Laval, Political Science Poitras, Julien; Université Laval, Legare, France; CHU de Quebec and Universite Laval,
Primary Subject Heading:	Emergency medicine
Secondary Subject Heading:	Health services research, Medical management, Qualitative research
Keywords:	Rural emergency departments,, Health care, Performance, Unwarranted variations in practice

Rural emergency care 360°: Mobilizing healthcare professionals, decision-makers, patients and citizens to improve rural emergency care in the province of Quebec, Canada: a qualitative study protocol

Richard Fleet, MD, PhD[1,2], Gilles Dupuis, PhD[3], Jean-Paul Fortin, MD[4], Jocelyn Gravel, MD, MSc[5], Mathieu Ouimet, PhD[6], Julien Poitras, MD[1,2], France Légaré, MD, PhD[7]

[1]Department of Family and Emergency Medicine, Université Laval, Quebec, QC, Canada;

[2]Research Chair in Emergency Medicine, CHAU-Hôtel-Dieu de Lévis (Université Laval); Lévis, QC, Canada;

[3]Department of Psychology, Université du Québec à Montréal, Montreal, QC, Canada ;

[4]Centre intégré universitaire de santé et de services sociaux de la Capitale-Nationale, Québec, Canada ;

[5]CHU Sainte-Justine, Université de Montréal, Montréal, Canada ;

[6]Department of Political Science, Université Laval, Quebec, QC, Canada;

[7]Department of Family Medicine and Emergency Medicine, Knowledge Transfer and Health Technology Assessment Group of the CHU de Québec Research Centre, Unité de Recherche Évaluative, Université Laval, Quebec, QC, Canada.

Corresponding author: Dr. Richard Fleet; CSSS Alphonse-Desjardins Research Centre, Hôtel-Dieu de Lévis, 143 Wolfe Street, Lévis, QC, Canada, G6V 3Z1. Phone: +1 418-835-7121 ext. 3173; Fax: +1 418-835-7276; Email: rfleet@videotron.ca

Abstract:

Introduction: Emergency departments (EDs) are an important safety net for rural populations. Results of our earlier studies suggest that rural Canadian hospitals have limited access to advanced imaging services and intensive care Units (ICUs) and that patients are transferred over large distances. They also revealed significant geographical variations in rural services. In the absence of national standards, our studies raise questions about inequities in rural access to emergency services and the risks for citizens. Our goal is to build recommendations for improving services by mobilizing stakeholders interested in rural emergency care. With help and full engagement of stakeholders, we will 1) identify solutions for improving quality and performance in rural emergency departments; 2) formulate and prioritize recommendations; 3) transfer knowledge of the recommendations to rural emergency departments and support operationalization; 4) assess knowledge transfer and explore further impacts of this participatory action research project.

Methodology: We will use a participatory action research approach. We will plan for a governance structure that includes all stakeholders' representatives so throughout this project, stakeholders are fully engaged at every step. Our sample will be 26 emergency departments in rural Quebec. We will conduct semi-structured individual and focus group interviews with relevant and representative participants, including patients and citizens (estimated N=200). Interviews will be thematically analyzed to extract potential solutions and other qualitative information.

An expert panel (±15) will use an analysis grid to develop consensus recommendations from solutions suggested and will evaluate feasibility, impacts, costs, conditions for implementation,

and establish monitoring indicators. Recommendations will be transferred to stakeholders using tailored knowledge translation strategies (web platform, meetings, etc.).

Discussion and expected results: This study will result in a comprehensive consensus list of feasible and high-priority recommendations enabling decision-makers in emergency care to implement improvements in rural emergency care in Quebec.

Ethics and dissemination: This protocol has been approved by the CSSS Alphonse-Desjardins research ethics committee (Project number: MP 2017 - 009). The qualitative material will be kept confidential and the data will be presented in a way that respects confidentiality. The dissemination plan for the study includes publications in scientific and professional journals. We will also use social media to disseminate our findings and activities such as communications in public conferences.

Strengths of this study:

- First research project to mobilize a diverse group of stakeholders to find solutions for improving care and services in Quebec rural emergency departments;
- Consensus on a comprehensive list of feasible and high-priority recommendations for improving the performance of Quebec rural emergency departments;
- Recommendations will be immediately applicable and we will explore their impact by evaluating and monitoring this knowledge mobilization initiative.

Methodological limitation:

- Participant selection not –randomized but theoretically representative;
- Interviews and committee participation is time-consuming and participants with busy schedules may decline participation or may not continue to the end of the study.

Word count: Abstract 295; Main text 2912

Keywords: Rural emergency departments, Health care, Performance, Unwarranted variations in practice, Participatory action research

Introduction

Providing high-quality emergency care in rural areas poses specific challenges that are understudied. Rural emergency departments (EDs) treat four million patients per year in Canada, representing 30% of all emergency consultations, while those living in rural areas are only 20% of the whole population (1-3). Compared with urban populations, rural populations are older, in poorer health, and more at risk of injury (4-8). Rural EDs represent an important safety net for rural populations, especially in contexts where there are few alternatives to hospital emergency services, many people are without a family doctor, and recruiting and retaining physicians is difficult (9). Our previous work showed that access to care and services varies from one part of Canada to another (rural/urban, rural/rural) (3, 10). In fact, 74% of rural EDs in Quebec have 24/7 access to a general surgeon, ICU and CT scans, elsewhere in the country fewer than 20% of EDs have access to these services (3, 10). These variations in access to care suggest inequities in accessibility, quality and effectiveness of ED care and services across rural and urban EDs and raise questions about Canada's universal healthcare system. Moreover, in the past decade a wave of centralization of healthcare services has taken place, largely because of budgetary constraints and a shortage of medical personnel. This has led to a reduction of services in rural areas and the closure of several small community hospitals, contributing to the wide variations in practice observed today (2, 11, 12). In the present context of growing needs and limited resources, policy-makers are reviewing emergency services and their place in the continuum of care. Policy-makers need evidence to inform their choices about allocation of emergency care and services for vulnerable populations in remote areas (2, 13, 14). In 1997, the Canadian Association of Emergency Physicians (CAEP) made several recommendations about improving medical practice in rural EDs across the country (15). However, the field of emergency medicine has evolved

significantly over the past 15 years (16), and an update of these recommendations that is based on recent evidence is needed.

The Quebec Ministry of Health and Social Services (MSSS) published an ED management guide (Guide de gestion de l'urgence, 2000, updated 2006) (17), but it is clear that its use is not widespread in rural EDs (16). In spite of appeals for change, there is thus an urgent need for standards for rural EDs that managers of these EDs can turn to (2, 12, 13).

The main objective of this innovative participatory action research project is therefore to address these practice variations and the absence of standards applied in the context of Quebec's rural EDs. In collaboration with more than 200 rural emergency stakeholders and citizens, we plan to co-produce recommendations for improving the performance of EDs that are both evidence-based and respectful of the constraints of real world concerns. We use the MSSS definition of performance which includes access, quality and optimisation dimensions. This definition is in accordance with the conceptual framework and the needs of the majority of the stakeholders of the research who are members of the Québec Health System (18). Collaboration among stakeholders will identify promising interventions, especially in the continuum of care, based on best evidence and on best practices in similar situations. This process will bring existing solutions to light and adapt them to the realities of rural contexts, increasing likelihood of the implementation of the recommendations. We use the knowledge transfer (KT) framework developed by the National Public Health Institute of Québec (19) which allows us to focus on the different steps from coproduction to use of knowledge. It also highlights the multiple KT strategies from dissemination to appropriation of knowledge. This framework justifies the

participatory research approach used in this project and gives us guidelines to evaluate the KT process.

Potentials solutions for improving accessibility, quality and effectiveness of rural EDs

Through our literature review and the results of our earlier research, the expertise of our multidisciplinary team and the experience of our partners we have already identified the following solutions that could improve accessibility, quality and cost-effectiveness in rural emergency care and services: improvement of emergency prehospital care (e.g. optimization of transfers); use of new technologies (e.g. telemedicine, Point of Care Ultrasound (POCUS)); optimal use of resources (e.g. access to medical specialists and facilities); training (e.g. simulation-based learning) and improved management procedures (e.g. facilitating the implementation of the ED management guide ("Guide de gestion de l'urgence"); standardize databases for better measurement of quality indicators). These solutions will be proposed to participants of our study in order to validate the potential usefulness and applicability.

Improving emergency prehospital care using remote monitoring

The distances between tertiary care hospitals and rural residents limit their access to specialist services and facilities. Our data suggests that most rural EDs are more than 300 km from tertiary and secondary care trauma units, and an average of 300 inter-hospital transfers are required per year in each rural ED (3, 16). The quality of emergency care in rural areas thus depends on the capacity to perform procedures locally and transfer patients who require it to the nearest referral centre after stabilizing them (20, 21). This process must be both timely and safe. Inter-hospital transfers, however, are expensive and expose patients to complications (e.g. road accidents) (22, 23). Moreover, many patients who are in pain or have not been stabilized require a medical or

nursing escort, which can cause staff shortages in the emergency room and is very expensive (24). One promising solution is prehospital remote monitoring, whereby ambulance personnel and nurses can be supported from a distance (25).

Training medical personnel

Compare to emergency medicine professionals in urban areas, those in rural areas are proportionally less exposed to various medical situations, including managing trauma related injuries (26), and other serious clinical conditions. In addition, according to our data, one third of rural physicians have less than five years of practice experience and only 6% have had extra emergency medicine training – CCFP (EM) Canadian College of Family Medicine certification of special competency in emergency medicine (total of 3 years post-graduate (MD) training), or Fellowship of the Royal College of Physicians speciality in emergency medicine (FRCP) (5 years post-graduate (MD) training. Rural physicians are requesting additional training (27). Simulation-based learning or clinical immersion programs are promising innovations in medical education that could meet the educational needs of rural emergency physicians (28, 29).

Quality improvement through standardization

The use of care protocols or guidelines in treating some emergency conditions, such as sepsis (30), strokes (31), cardiovascular problems as well as trauma could improve the quality of care (30, 32). This would be a relevant and evidence-based approach to reducing practice variations. However, the actual use of care protocols in both rural and urban contexts and their respective impacts on patient-care and health are unknown.

Objectives

The main objectives of this study are therefore to:

1) Identify solutions for improving quality and performance in rural emergency departments by mobilizing stakeholders (decision-makers, professionals, patients and citizens);

2) Formulate and prioritize recommendations based on solutions identified;

3) Transfer knowledge of recommendations to improve quality and performance in rural EDs and support the implementation of the recommendations and identified solutions;

4) Assess knowledge transfer and explore further impacts of the participatory action research project.

Methodology

We chose to use a participatory action research approach for this multipronged project (33). Our hypothesis is that this process of knowledge co-construction will facilitate implementation of the recommendations.

Selection of EDs and study participants

Participating rural EDs will mostly be the same as in our earlier projects and represent 100% of Quebec rural EDs (N=26). Ongoing changes, including mergers, in the Quebec hospital system may slightly affect our selection criteria at the time of the study's onset. Briefly, these are hospitals that offer 24/7 emergency coverage, including inpatient beds, and are situated in "rural or small towns" according to the Statistics Canada's (34) definition (population more than 10,000 but density of less than 400 people per km2, population less than 10,000 but density of more than 400 people per km2, or population less than 10,000 and density of less than 400 people per km2 (we are revising as per changes in recent census). Two principles will guide the recruitment of

participants: participant's characteristics which are susceptible to give rise to different viewpoints (e.g. years of experience, shift work, profession, etc.) and data saturation (35). Respect for representativity of the different types of EDs under study will take precedent over a statistically-based representativity in recruiting all stakeholders. Patient/citizens selection, will follow a research approach that emphasizes public involvement (36). For health care professionals, recruitment will focus on relevant professions/positions best suited to answer our ED specific questions: physicians, nurses, head nurses, administrators, diagnostic technicians, laboratory technicians, psychosocial professionals, pre-hospital emergency professionals. Local media and snowballing will be used for recruitment purposes. In addition, a "champion" will be identified in each rural ED. The criteria for the recruitment of the champions go as follow: 1) the champions must by familiar with the ED and, 2) they may occupy any function as long as they have good knowledge of the ED and its staff. The champion approach is often used in projects where the researchers are far away from the study site. Champions are people who know the culture of the site and its particular concerns (37, 38). They will collaborate with the research team throughout the project, especially as recruitment facilitators and knowledge brokers.

Data collection:

Objective 1: Mobilize stakeholders to propose solutions for improving quality and performance in rural EDs

In the first phase of the project, the multiple stakeholders will be invited to participate in semi-structured focus groups (39) or individual interviews (40) to discuss potential solutions for improving accessibility, quality and effectiveness in rural EDs. The interview guide will address topics relating to the particularities of each rural region (e.g. the health and social care services

available, the current situation of emergency services, the roles of the various emergency professionals, potential solutions for improving services, and barriers and facilitators to implementing these solutions).

Interviews will be planned as follows: a) ± 40 individual interviews with decision makers at all levels or the health system: "Ministère de la Santé et des Services sociaux (MSSS)", regional health and social care centres, local point of care; b) ± four focus groups (± seven participants each), one for each profession identified (physicians, nurses, prehospital emergency services, psychosocial care); c) ± four focus groups with patients and citizens, one for each of the following categories: patient committee members, mayors, community workers, concerned citizens. The number of interviews will be increased until data saturation is reached. They will be led by a research professional with experience in qualitative research and will be recorded and transcribed verbatim.

Thematic analysis of data using NVivo software will generate a coding tree (themes and subthemes) of solutions for improving performance in rural EDs. Qualitative information about these solutions (context, feasibility) will also be extracted (41). The robustness and clarity of the categories will also be assessed through discussion with the research team (42). We will provide the COREQ checklist for the reporting of qualitative studies with the manuscript that will present the qualitative results.

Objective 2: Formulate and prioritize recommendations based on solutions identified

In the second phase of the project, the solutions identified through mobilizing stakeholders (Objective 1) will be submitted to a panel of experts. This panel will formulate consensual

recommendations based on the solutions extracted and will evaluate their feasibility, impacts, costs and conditions for their implementation. The expert panel (±12) will include members of the research team, academia, university hospitals, professional associations and colleges as well as our rural champions and partners (43). Selection criteria will be based on peer recognition and individual credibility. This panel will also establish monitoring indicators for implementing the recommendations.

A two-phase process will be used to establish the consensual recommendations. First, an anonymous by Email process will be implemented and, second, a nominal face-to-face process will be used to generate those consensual recommendations.

The anonymous by Email process will use a multidimensional analysis grid that will be sent to the experts so that they will be able to evaluate each of the solutions identified in Phase 1 of the study. The data collection tool will contain a five-point Likert scale used to rate the solutions and open-ended spaces to comment on each measure. They will assign a priority to each measure based on their assessment of, 1) effectiveness, 2) security or negative externalities, 3) costs, 4) organizational impact (implementation). They will also be asked to comment on the conditions for its implementation and indicate relevant monitoring indicators. Finally, in order to compare solutions, the research team in collaboration with the expert panel will determine the weight of each criteria (e.g. Efficiency 30%, Security 30%, Costs 20%, Organizational impact 20%).

Data from this analysis grid will be used to guide discussions during the second face-to-face nominal process with the experts which will take place in person during a two-day meeting. Through this nominal process, they will reach a consensus about the priority of the identified

solutions and their feasibility, with help from a facilitator with expertise in consensus activities. The consensus recommendations (detailed descriptions, priority, feasibility, cost estimates, etc.) will be compiled in a document that will be the main deliverable at this stage. The document will also mention other suggestions raised during Phase 1 but that were not part of the final consensus.

Objective 3: Transfer recommendations to improve quality and performance in rural EDs and support their implementation

In Phase 3, the consensus recommendations produced in Phase 2 will be presented to all stakeholders involved in Phases 1 and 2 and to others stakeholders from the EDs involved in the research. A variety of strategies will be implemented to connect with stakeholders and accompany them in understanding, adapting, and, eventually, adopting the recommendations. The possible strategies (conferences, videoconferences, websites, social media, communities of practice, etc.) will be defined according to the nature of the recommendations that emerge from the research process and through discussions with the stakeholders (our partners, site champions, etc.). As researchers, we will have a key role in coproducing, presenting and adapting the knowledge. We will also support the reception, adoption and appropriation of knowledge by acting as a networking hub for participating EDs and members of our expert panel and by suggesting tools to implement some solutions. Our collaborators and co-researchers will all contribute to accompany the rural sites depending of the needs expressed in each case, in a spirit of fostering partnership between central and remote locations so that each can understand the situation of the others.

Objective 4: Assess knowledge transfer and explore further impacts of the participatory action research project

We will assess the knowledge transfer and implementation in the targeted local sites with a questionnaire validated beforehand that uses a Likert scale followed by open questions. The survey will assess a) knowledge of the recommendations; b) implementation of solutions to address identified barriers and facilitators; c) intention to adopt proposed solutions; d) barriers and facilitators experienced on site by those implementing the recommendations; and e) satisfaction with the project/its relevance.

This online survey will take place at the end of Phase 3 (Period 0), then again five and eight months later. This survey will also enable us to measure the extent of stakeholders' participation in the project and retention rates, and to identify characteristics of sites that adopted (or not) some of the solutions and characteristics of the solutions that had the most impact.

The second part of our evaluation will be an exploratory assessment of the impacts of the changes initiated. Given that adopting recommendations takes time, the real impact of resulting changes on the performance of EDs could occur later, perhaps outside the project timetable. However, we will conduct an exploratory quantitative analysis of the associations between adoption of the recommendations and performance measures in emergency using the indicators determined by the expert panel in Phase 2. These indicators will be based mostly on those of the MSSS, the "Direction des soins urgents, de la traumatologie et du continuum clinique (DSUTCC)" and the Canadian Institute for Health Information, as well as quality of care indicators proposed by Schull et al. (44), which we validated in earlier studies (45). Some of the recommendations (training, telemedicine, etc.) may have an immediate impact on certain performance and quality

of care indicators, and these will be measured (e.g. number of transfers, duration of transfers, treatment of specific conditions, etc.).

Discussion and expected results

This study is based on a participatory action research approach that fosters the application of scientific knowledge in practice and management (46, 47). Our research should therefore result in relevant recommendations that are likely to be adopted. The recommendations resulting from this project could be added to a new version of the Quebec emergency management guide (MSSS, 2006) and piloted by the DSUTCC, which is one of the knowledge users in this study. The results are also eagerly awaited by other emergency medicine associations and representatives in other provinces. This research experience, involving large-scale mobilization, will hopefully serve as a model for improving performance in all areas of our health and social care system.

Finally, we will be contributing to the science of knowledge translation. We will document knowledge translation strategies that are effective in this context, which is currently a gap in the literature (48).

Acknowledgements

We wish to thank the rural emergency staff of the province of Québec for participating in our previous study as well of the "Direction des soins critiques et urgents Ministère de la Santé et des Services sociaux". We also wish to thank our collaborators: Denise Trudel, Jean-Guy Trottier, Dr Alain Tanguay, Mme Hélène Sylvain, Mr. Daniel Paré, Dr Jean Ouellet, Dr Gilles Lortie, Dr Antoine Groulx, Dr Jean Marc Chauny, Mr. Maxime Laviolette, Mr. Patrice Aubertin, Dr Alex

Pool, Dr Jeff Plant, Mr. Louis Luc Beaudoin, Mr. Jean-François Racine and Mrs Catherine Turgeon-Pelchat.

Competing interests and Funding

The authors declare not having any financial or other conflicts of interest related to the submission. The research project is supported from the "Fonds de Recherche du Québec – Santé (FRQS) " 32825.

Authors Contributors:

RF was responsible for the original idea, literature review and study design. He drafted the initial manuscript and its revised versions. GD, JPF, JG, FL, MO, JP contributed significantly to the manuscript drafting and preparation, revision and formatting the manuscript. RF has contributed to various aspects of the study design with input relating to their specific expertise in the field. All authors read and approved the final manuscript.

References

1. Statistics Canada. Population, urban and rural, by province and territory. Available at: http://www.statcan.gc.ca/tables-tableaux/sumsom/l01/cst01/demo62f-eng.htm. Accessed November 18, 2014.

2. Fleet R, Archambault P, Plant J, Poitras J. Access to emergency care in rural Canada: should we be concerned? Cjem. 2013;15(4):191-3.

3. Fleet R, Poitras J, Maltais-Giguere J, Villa J, Archambault P. A descriptive study of access to services in a random sample of Canadian rural emergency departments. BMJ Open. 2013;3(11):e003876.

4. Canadian Institute for Health Information. How Healthy Are Rural Canadians? An Assessment of Their Health Status and Health Determinants. Ottawa2006.

5. Fatovich DM, Jacobs IG. The relationship between remoteness and trauma deaths in Western Australia. J Trauma. 2009;67(5):910-4.

6. S L. Rural Canada: Access to health care. Available at: http://publications.gc.ca/Collection-R/LoPBdP/BP/prb0245-e.htm. (Accessed September 26, 2014).

7. Peek-Asa C, Zwerling C, Stallones L. Acute traumatic injuries in rural populations. Am J Public Health. 2004;94(10):1689-93.

8. Zakrison T, Ball CG, Kirkpatrick AW. Trauma in Canada: a spirit of equity & collaboration. World J Surg. 2013;37(9):2086-93.

9. Gauthier J HJ, Lamarche P, Lévesque JF, Morin D. Entre adaptabilité et fragilité : les conditions d'accès aux services de santé des communautés rurales et éloignées. Institut national de santé publique du Québec 2009.

10. Fleet R, Pelletier C, Marcoux J, Maltais-Giguere J, Archambault P, Audette LD, et al. Differences in access to services in rural emergency departments of Quebec and Ontario. PLoS One. 2015;10(4):e0123746.

11. R C. Is regionalization working? CMAJ. 2010;182(4):331-2.

12. Fleet R, Plant J, Ness R, Moola S. Patient advocacy by rural emergency physicians after major service cuts: the case of Nelson, BC. Can J Rural Med. 2013;18(2):56-61.

13. Romanow RBoV. The Future of Health Care in Canada. [Online, 2002). Available at: http://www.ubcmj.com/pdf/ubcmj_2_2_2011_7-8.pdf (Accessed september 29, 2015).

14. Bilbey N LS. Canadian Health Care: A Focus on Rural Medicine. UBCMJ; 2011. Available at: http://www.ubcmj.com/pdf/ubcmj_2_2_2011_7-8.pdf (Accessed september 29, 2015).

15. Canadian Association of Emergency Physicians. Recommendations for the management of rural, remote and isolated emergency health care facilities in Canada. 1997. Available at: http://caep.ca/resources/position-statements-andguidelines/ management-rural-remote-and-isolated-emergency-health-c (Accesse September 26, 2014).

16. Fleet R, Poitras J, Archambault P, Tounkara FK, Chauny JM, Ouimet M, et al. Portrait of rural emergency departments in Quebec and utilization of the provincial emergency department management Guide: cross sectional survey. BMC Health Serv Res. 2015;15:572.

17. Ministère de la Santé et des Services sociaux du Québec. Guide de gestion de l'urgence. Québec: Gouvernement du Québec; 2006.

18. Ministère de la Santé et des Services sociaux du Québec. Cadre de référence ministériel d'évaluation de la performance du système public de santé et de services sociaux à des fins de gestion. 2012:25 pages.

19. Institut national de santé publique du Québec. Animer un processus de transfert des connaissances : bilan des connaissances et outil d'animation. 2009.

20. Fleet R, Poitras J. Have we killed the golden hour of trauma? Ann Emerg Med. 2011;57(1):73-4; author reply 4-5.

21. Rourke JT, Kennard M. Emergency patient transfers from rural hospitals: a regional study. Cjem. 2001;3(4):296-301.

22. Bosk EA, Veinot T, Iwashyna TJ. Which patients and where: a qualitative study of patient transfers from community hospitals. Med Care. 2011;49(6):592-8.

23. Hains IM, Marks A, Georgiou A, Westbrook JI. Non-emergency patient transport: what are the quality and safety issues? A systematic review. Int J Qual Health Care. 2011;23(1):68-75.

24. Ministère de la Santé et des Services sociaux. Services préhospitaliers: Urgence d'agir Rapport du Comité national sur les services préhospitaliers d'urgence (2014). Available at: http://publications.msss.gouv.qc.ca/acrobat/f/documentation/2014/14-929-01W.pdf (Accessed october 27, 2015).

25. Charash WE, Caputo MP, Clark H, Callas PW, Rogers FB, Crookes BA, et al. Telemedicine to a moving ambulance improves outcome after trauma in simulated patients. J Trauma. 2011;71(1):49-54; discussion 5.

26. Waymack JR, Markwell S, Milbrandt JC, Clark TR. Comparison of rates of emergency department procedures and critical diagnoses in metropolitan and rural hospitals. Rural Remote Health. 2015;15(4):3298.

27. Drouin MA, Fleet R, Poitras J, Archambault P, Chauny JM, Levesque JF, et al. The Quebec rural emergency department project: a cross-sectional study of a potential two-pronged strategy in the knowledge transfer process. PLoS One. 2015;10(4):e0120523.

28. Agha S, Alhamrani AY, Khan MA. Satisfaction of medical students with simulation based learning. Saudi Med J. 2015;36(6):731-6.

29. Lateef F. Simulation-based learning: Just like the real thing. J Emerg Trauma Shock. 2010;3(4):348-52.

30. Kuan WS, Ibrahim I, Leong BS, Jain S, Lu Q, Cheung YB, et al. Emergency Department Management of Sepsis Patients: A Randomized, Goal-Oriented, Noninvasive Sepsis Trial. Ann Emerg Med. 2016;67(3):367-78.e3.

31. Canadian Stroke Best Practice Recommendations. Hyperacute stroke care (2015). Available at: http://www.strokebestpractices.ca/ (Accessed september 29, 2015).

32. Stewart M, Bledsoe J, Madsen T, Sturges Z, McGuire T, Rayner T, et al. Utilization and Safety of a Pulmonary Embolism Treatment Protocol in an Emergency Department Observation Unit. Crit Pathw Cardiol. 2015;14(3):87-9.

33. Smith L RL, Schmidt M. Best practices in the reporting of participatory action research: Embracing both the forest and the trees. The Counselling Psychologist. 2010;38(8):1115-1138.

34. Statistique Canada, Definitions of rural. Rural and Small Town Canada Analysis Bulletin. 2001;3(3):1- 17.

35. Savoie-Zajc L. Comment peut-on construire un échantillonnage scientifiquement valide? Recherches Qualitatives; 2007(5):99-111.

36. Boivin A, Lehoux P, Burgers J, Grol R. What are the key ingredients for effective public involvement in health care improvement and policy decisions? A randomized trial process evaluation. Milbank Q. 2014;92(2):319-50.

37. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci. 2009;4:50.

38. MacDougall C, Fudge E. Planning and recruiting the sample for focus groups and in-depth interviews. Qual Health Res. 2001;11(1):117-26.

39. Morgan DL, Keueger, R. A. The Focus Group Kit (six book set). Thousand Oaks, Calif: Sage. 1998.

40. Savoie-Zajc L. L'entrevue semi-dirigée. Dans B. Gauthier (Dir.) : Recherche sociale : de la problématique à la collecte de données (5e édition). Québec, Québec : Presses de l'Université du Québec. 2009.

41. Paillé P, & Mucchielli, A. L'analyse qualitative en sciences humaines et sociales. Armand Colin. 2012.

42. Thomas D. A General Inductive Approach for Analyzing Qualitative Evaluation Data. 2006; 27 (2): 237-246.

43. Jones J, Hunter D. Consensus methods for medical and health services research. Bmj. 1995;311(7001):376-80.

44. Schull MJ HC, Guttmann A, Leaver CA, Vermeulen M, Rowe BH, Anderson GM, Zwarenstein M. . Development of a Consensus on Evidence-Based Quality of Care Indicators for Canadian Emergency Departments. ICES Investigative Report. Toronto: Institute for Clinical Evaluative Sciences; 2010.

45. Layani G, Fleet R, Dallaire R, Tounkara FK, Poitras J, Archambault P, et al. The challenges of measuring quality-of-care indicators in rural emergency departments: a cross-sectional descriptive study. CMAJ Open. 2016;4(3):E398-e403.

46. Israel BA, Schulz AJ, Parker EA, Becker AB. Review of community-based research: assessing partnership approaches to improve public health. Annu Rev Public Health. 1998;19:173-202.

47. Jagosh J, Macaulay AC, Pluye P, Salsberg J, Bush PL, Henderson J, et al. Uncovering the benefits of participatory research: implications of a realist review for health research and practice. Milbank Q. 2012;90(2):311-46.

48. Parsons JE, Merlin TL, Taylor JE, Wilkinson D, Hiller JE. Evidence-based practice in rural and remote clinical practice: where is the evidence? Aust J Rural Health. 2003;11(5):242-8.