

The ARTS of risk management in rural and remote medicine

Frederic B. McConnel, MBBS, DObst RCOG, MPH, FAFPHM, FACRRM

(at the time of writing) Outreach Public Health Physician, Northern Territory Department of Health and Community Services, Katherine, Northern Territory, Australia

Dennis Pashen, MBBS, MPHTM, FRACGP, FACRRM

Director, Mount Isa Centre for Rural and Remote Health, Mount Isa, Queensland, Australia

Rick McLean, MBBS, MD, FRACP

School of Rural Health, Dubbo Base Hospital, Dubbo, New South Wales, Australia

Correspondence to: Dr. Frederic B. McConnel, PO Box 2457, Katherine NT 0851, Australia

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Introduction: This paper describes an action research process (in which the researchers are active participants throughout the process of development, testing and refinement) to develop a framework for clinical risk assessment and management in the context of rural and remote medicine. The framework is needed to support educational, medicolegal and quality improvement processes in rural and remote medical practice.

Methods: The research process included identifying a problem and gradually developing a research question, developing a potential model for application in a specific context, refining the tool and piloting the tool in a limited context. The research question and framework were developed during a series of teleconferences under the aegis of the Censorial Panel of the Australian College of Rural and Remote Medicine (ACRRM). After the framework was developed and refined, it was tested at a workshop in conjunction with the ACRRM Scientific Forum in Alice Springs, Australia, in July 2004. Workshop participants were principally but not exclusively rural medical practitioners from across Australia. The main outcome measure was a working framework for risk management broadly applicable in rural and remote medicine.

Results: The process clarified differences between safety and quality approaches in metropolitan and rural and remote medical practice, culminating in an appropriate clinical risk management framework.

Conclusion: The action research as undertaken resulted in a workable risk management framework that is worthy of further development and that may be a valuable educational tool, both for existing practitioners and for future rural doctors. Further, it has potential as a means of providing legal protection to rural practitioners when actual rural practice is at odds with "best practice" as defined by a metropolitan group of experts.

Introduction : Ce document décrit un processus de recherche-action (dans le contexte duquel les chercheurs participent activement à l'ensemble du processus d'élaboration, essai et amélioration) visant à élaborer un cadre d'évaluation et de gestion des risques cliniques en médecine dans les régions rurales et éloignées. Ce cadre est nécessaire pour appuyer des processus d'éducation, médicolégaux et d'amélioration de la qualité en pratique de la médecine en milieu rural et éloigné.

Méthodes : Le processus de recherche a consisté notamment à définir un problème et à élaborer graduellement une question de recherche, à mettre au point un modèle possible d'application dans un contexte précis, à raffiner l'outil et à en faire l'essai pilote dans un contexte limité. On a élaboré la question et le cadre de recherche au cours d'une série de téléconférences sous l'égide du Censorial Panel de l'Australian College of Rural and Remote Medicine (ACRRM). Une fois le cadre mis au point et raffiné, on l'a mis à l'essai en juillet 2004 au cours d'un atelier du Forum scientifique de l'ACRRM, à Alice Springs, Australie. Les participants à l'atelier étaient principalement, mais non exclusivement, des médecins ruraux de toutes les régions de l'Australie. Le cadre pratique de gestion du risque applicable de façon générale à la médecine en milieu rural et éloigné constituait la principale mesure de résultat.

Résultats : Le processus a clarifié des différences entre des approches axées sur la

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sécurité et la qualité dans la pratique de la médecine en région métropolitaine et en milieu rural et éloigné et a produit un cadre approprié de gestion des risques cliniques.
Conclusion : La recherche-action entreprise a produit un cadre pratique de gestion des risques qu'il vaut la peine de développer davantage et qui peut constituer un outil précieux d'éducation à la fois pour les praticiens actifs et pour les futurs médecins ruraux. Il est de plus porteur de possibilités comme moyen de fournir une protection légale aux médecins ruraux lorsque la pratique rurale réelle entre en conflit avec la «meilleure pratique» telle que définie par un groupe d'experts d'une région métropolitaine.

Introduction

Although quality has been the key issue in health care since Donald Berwick brought the work of Alexander Demming to the attention of the medical community in the 1980s,[1] it is being complemented and possibly superseded by a focus on risk in the last 10–15 years. In Australia, this has occurred since the 1995 landmark study of Wilson and colleagues,[2] in which medical errors were firmly identified as resulting in significant morbidity and mortality for hospital inpatients. The Australian Council for Safety and Quality in Healthcare, established in 2000, has reinforced the focus on safety and risk management. Following major events overseas[3] and more recently in Australia,[4,5] risk management has become a major priority for health systems.

The work of James Reason[6] was seminal in identifying the events leading up to an adverse event, and other industries, such as the airline industry, have used this framework in a very positive way. In medicine, such models have focused on patient safety through the analysis of adverse events almost entirely in the hospital setting. The process is retrospective and historical, and it gives rise to accumulated data on which to plan, improve and monitor. Vincent and colleagues' framework and root cause analysis are examples of this approach.[7]

A generic approach, applicable to a broad range of situations including health, is detailed in the Australian and New Zealand Standard for Risk Management.[8] The process is prospective but uses data when it is available, although it relies more on subjective assessment based on "what if" scenarios. Importantly, it allows for the assessment of impact on all stakeholders and it identifies opportunities as well as mitigating loss.

In the rural and remote context, however, there is little history of adverse event analysis, hence little data for planning improvement in any structured way.

RDA and ACCRM

Rural and remote medicine in Australia has successfully traversed several major crossroads. Some 10 years ago it was realized that the then current organizations in Australia were not adequately serving the needs of either rural and remote practitioners or their patients. This brought about the establishment of the Rural Doctors Associations (RDA) in all states and the Australian College of Rural and Remote Medicine (ACRRM). These organizations have campaigned strongly for rural health and their recent application to the Australian Medical Council for the recognition of rural and remote medicine as a specialty in its own right (Application for Recognition of the Specialty of "Rural and Remote Medicine" by the Australian College of Rural and Remote Medicine. ACRRM, unpublished document, 2004) has seen the training program recognized as an accredited alternative for the training of rural generalists.[9]

Within the ACRRM, it has been necessary to critically examine what separates rural and remote medical practice from metropolitan medical practice. During this process, it became clear that risk and risk management in rural and remote medicine have characteristics that are unique, or at least sufficiently different from the characteristics when they are applied in a metropolitan setting to warrant further examination.

Thus the work of the Quality and Safety in Practice Committee of the ACRRM Censor's Panel (of which the authors were members) developed into an action research project in relation to risk in rural and remote medicine with the following aims:

- Improve patient safety by educating rural and remote practitioners about risks specific to the rural and remote context. This will enable informed management decisions that minimize the impact of risk on all stakeholders.
- Reduce the effect of the current attitude of

defensive medicine on the recruitment of junior doctors to rural and remote science.
- Analyze risk in rural and remote medicine to help define the specialty.
- Develop a framework for the analysis of events and research that would provide context-specific evidence for rural and remote best practice.

Methods

As opposed to a carefully designed prospective randomized controlled trial designed to answer one question, this project had characteristics of action research with the development of an iterative approach to the research question.

We briefly describe 6 stages; their outcomes will be presented sequentially in the results section.

Identifying the problem and gradually developing the research question

The need to define risk in the context of rural and remote medicine was identified as an important part of the process of trying to define what makes rural and remote medicine unique.

Literature search

We undertook a literature search to determine the current knowledge base about risk management, what is known about its specific application to medical areas and whether there is unique work in rural risk management.

Developing a potential model for application in a specific context

Following the literature review, it was important to determine whether any existing models of risk management could be applied directly to a rural context or if modifications would be necessary to ensure applicability in the local setting.

Refining of the tool

Following the initial development of a model, it was important to undergo an iterative process with a range of rural and remote stakeholders to refine the model so that it could be more broadly applicable.

Piloting the tool in a limited context

Once we decided on a model, it was necessary to "road test" it with a range of previously uninvolved rural and remote practitioners. This was done in the context of a workshop at the ACRRM Scientific Forum in Alice Springs, Australia, in July 2004.

Further refining the tool and extending the concept more broadly

This is in the planning stages.

Results

Identifying the problem and gradually developing a research question

There are several key distinguishing features of rural and remote medicine practice patterns:
- The care provided in rural and remote areas, including procedural and other advanced medicine, which in urban settings would ordinarily be provided by a range of separate medical craft groups (i.e., disciplines, specialties and subspecialties), is complex. This means that an individual's scope of practice requires a broad core as well as specific advanced clinical knowledge and skills, including knowledge of Aboriginal and Torres Strait Islander health issues, emergency care skills and knowledge of population health.
- The roles and settings, including hospitals and other community health facilities, are diverse. The geographic and sociologic contexts of practice range from larger regional centres to extremely remote communities, and the distinct health or morbidity profiles across rural and remote Australia must be taken into consideration.
- There is extensive practice of distance-based professional collaboration between rural and remote medical practitioners and other specialists in the provision of shared care, skills transfer and education.
- Rural medical practitioners face longer working hours and on-call responsibilities coupled with significant workforce shortages.
- There is closer contact between the doctor and the individuals within the community, and there are implications of the social–professional mix in that relationship.
- In the event of an adverse outcome, there are implications to the doctor and to the community.

From this analysis, we considered it likely that risk management in rural and remote areas would be different from that in metropolitan practices.

We developed the questions, "If this is so, what

models exist that can be used locally or do they need to be modified, and what value might any be, if applied in particular contexts?"

Literature search

The literature review revealed many methods for risk assessment and management,[10–14] but in relation to medicine, the seminal framework is that of Vincent and colleagues.[7] It was developed and validated in the major hospital context, which the authors suggested could be adapted to a range of circumstances. However it is clear that this work is primarily a retrospective approach and not ideally suited to the breadth of circumstances or the range of stakeholders encountered in the rural and remote context.

Developing a potential model for application in a specific context

We decided to explore the generic approach specified in the Australian and New Zealand standard for risk management,[8] which is prospective in nature; it does rely on subjective assessments based on "what if" scenarios but allows the assessment of impact on all stakeholders. It also identifies opportunity and mitigates losses. The model has a sequence of steps:

1. Identify the context.
2. Identify the risks.
3. Analyze the risks.
4. Estimate the level of risks.
5. Treat the risks (in the rural and remote medicine context this is done via an education process or medicolegal checklist).

ARTS

Rural medical practitioners have taken into consideration components of the ARTS (assessment, resources, transport and support) list intuitively based on their extensive experience. The challenge was to make the process explicit. An earlier attempt by one author, which identified areas of risk that needed to be balanced, was sufficient to arouse interest in the concept within the ACRRM but did not have practical application.

In Far North Queensland, a mnemonic for decision making was developed to teach registrars in general practice, particularly obstetrics (Dr. Bruce Cameron, Atherton, Queensland: personal communication, 2003): RATS stood for resources, assessment, telephone and support. We decided to use RATS to modify Vincent's framework accordingly.

The RATS framework was changed to ARTS and we developed a model with a number of subheadings for each heading (Fig. 1). Assessment is primarily a situational analysis. The framework document is presented in the same form as the one that was used during the workshop, with the exception of some minor formatting and editing changes for publication purposes.

Risk analysis

In relation to risk analysis, we used the pre-existing Australian and New Zealand Standard for Risk Management[8] matrix framework. For level of risk, we applied the qualitative risk matrix that considered consequence (on a 5-point scale from 1, insignificant, to 5, catastrophic) compared with likelihood (rated from A, almost certain, to E, rare). The overall level of risk is the product of the consequence of impact of the risk, if realized, and the likelihood of the risk happening; thus, in each situation the risk can be rated on a 4-point scale as low, moderate, high or extreme (Table 1 and Table 2). These assessments are subjective but are an attempt to standardize the approach to quantification of the risks identified in the ARTS framework. Table 1 and Table 2 are those used at the workshop, with the exception of some minor formatting and editing changes for publication purposes.

Clinical management differs according to the level of risk. Extreme risk requires risk management measures that include extensive protocols that are adhered to, regularly checked procedures and constant vigilance. High risk requires specific protocols and education about them as well as familiarity with procedures. Moderate risk requires standard protocols with flexibility as well as general preparedness. Low risk is managed by improved routine procedures and good-quality practice.

Refining the tool

Each of the headings in the ARTS framework could be relevant to each of the stakeholders in any given scenario. In this light, it required a qualitative estimate of the level of risk that could then be fed into the ARTS framework to build a composite picture of the risk for each scenario. This was done using a steering group to develop the final instruments and to develop the plan for the workshop.

Initially, the concept was explored by using 3 typical clinical examples: acute appendicitis, acute myocardial infarction and acute psychosis. Manage-

ment for each condition by the primary attending clinician differs as a result of differences in geographical remoteness, access to support and professional expertise.

Table 3 describes the typical management of acute presentations by the primary attending clinician in different geographic settings as typified by Rural Remote Metropolitan Area codings. Generally, the more remote the location, the greater the involvement of the clinician and the less the available support. This will inevitably introduce an increased number and variety of more severe risks to both clinicians and patients.

Pilot study

We performed a pilot study at a half-day workshop in Alice Springs, Australia. About 40 participants were involved, including facilitators, speakers and support personnel. There were 21 formal participants, the vast majority of whom were doctors in small group settings. Following background presen-

The ARTS of rural and remote medicine (assessment, resources, transport, support)
Level of risk for patient (P), doctor (D) and community (C)

RISK IDENTIFICATION	P	D	C
ASSESSMENT (situational analysis)			
Complexity What risk of error does the clinical context and complexity result in? For example, is the clinical context acute or chronic, what speed of clinical response is required, are the diagnoses and treatment straight forward or are multiple steps required? Are there complex communication needs?			
Socioeconomic factors What risk will there be to the patient/family and community in relation to dislocation, cost, income and productivity?			
Cultural and psychological factors This risk relates primarily to those resulting from the patient and community's belief systems around illness, treatment and expectations, and around communication. For the doctor, it revolves around medicolegal risk and the pressures on management decisions from nonclinical sources.			
Public health issues This relates to infection control, occupational or environmental health issues, health promotion activities, and the risk to doctors, family and team from contagious illness.			
RESOURCES			
Human Given the available local human resources, what risk is there for the patient in this clinical context? Will safety for patients, practitioners, and the community be compromised by the demands of this case on local resources?			
Advice and information Is the availability of clinical information and specialist advice in this context adequate for patient safety or doctor support?			
Technical What risk is there for the patient in this clinical context given the physical infrastructure (facilities, communications, etc.)?			
TRANSPORT			
Additional risks What additional risk is there for the patient, doctor and other health personnel in this clinical context if transport is required?			
SUPPORT			
Psychological What are the risks to the patient and family, doctor, team and family, and community in this clinical context given the psychological (and professional) supports available to each?			
Management and organizational Are there systems in place that support the management of this case, or are they a barrier? Is the local (and distant) management supportive and enabling, or is it a battle to manage this case in the patient's best interest?			

Fig. 1. The ARTS framework, with the subheadings developed for each part of the framework (assessment, resources, transport and support).

tations relating to the importance of and rationale for the development of the risk assessment framework, we formed small group sessions in which a range of representative cases were discussed in an informal context by the groups applying the framework. These included medical, surgical and psychiatric case scenarios in both acute and chronic settings.

Each group reached a rating about level of risk for the patient, the doctor and the community for each item (if appropriate) in the ARTS framework. No attempt was made to reach an overall rating. At the end of the session, we assessed participants' learning and their thoughts about the value of the process and its ease of application to other contexts. At this stage, it was not considered appropriate to seek feedback about the specific cases.

The stated workshop objective was to enhance a joint understanding of the different and specific issues in risk management in the rural and remote context and to progress toward a working framework for risk management applicable to such a context. Participants were asked to rate the effectiveness of the workshop in achieving the identified learning objective. The results are presented in Table 4. The response rate was 19 out of 21, or 90%.

Positive comments were received in relation to the value of the technique for teaching and education, for considering risk management in the broader context and for promoting safe practice within rural environments. It was also suggested by a number of participants that the "transport" heading of the framework be divided into acute care transport issues and general issues of access to primary medical and referral or hospital services for patients and other stakeholders. Similarly, some participants suggested that a "family" category would be a useful addition to the stakeholder analysis. These changes have not been included in the appended framework (Fig. 1).

Further refining the tool and extending the concept more broadly

We have not yet refined the concept but plan to do so in the near future. There are also plans for discussion with other national organizations, such as the Australian Council for Safety and Quality in Healthcare.

Discussion

The action research as undertaken is the first stage of an evolving process that will integrate a "safety and quality" framework within rural and remote clinical practice and within a recognized professional medical college. The results from the workshop are encouraging. They indicate that there is grassroots support for work to be done to produce a product that is of more than academic interest.

There is no doubt that the process is currently complicated and subjective. If it is applied to multiple health problems in a range of contexts we may end up with results that are different or, at worst, conflicting, without any clear resolution. Further, the practical value of applying the framework to any particular case in a certain context is unclear at this stage. However, it must be stated that interest in the approach has been expressed by both the Australian

Table 1. Risk matrix and overall level of risk: qualitative measures of consequence of impact on patient, practitioner and community*

Level	Descriptor	Example, detail or description
1	Insignificant	No injuries, low financial loss, little inconvenience
2	Minor	Minor injury or health detriment, some financial loss, significant time impact
3	Moderate	Significant adverse event or outcome, disruption to family, practice or community
4	Major	Serious adverse outcome, permanent disability, costs beyond local resources, local health capacity exceeded
5	Catastrophic	Death, overwhelming effect on practice viability

*Adapted from the Australia and New Zealand Standard for Risk Management.[8]

Table 2. Risk matrix and overall level of risk: qualitative risk analysis matrix indicating overall grading of risk for each level of consequence and likelihood*

Likelihood	1 (insignificant)	2 (minor)	3 (moderate)	4 (major)	5 (catastrophic)
A (almost certain)	M	H	E	E	E
B (likely)	L	H	H	E	E
C (possible)	L	M	H	E	E
D (unlikely)	L	L	M	H	E
E (rare)	L	L	M	H	H

E = extreme risk; H = high risk; M = moderate risk; L = low risk.
*Adapted from the Australia and New Zealand Standard for Risk Management.[8]

Commission for Quality and Safety in Healthcare and medical defense organizations.

Feedback from individual practitioners involved in the first workshop indicates that ARTS has

Table 3. Management according to Rural Remote Metropolitan Area classification*

Condition	RRMA 1–2	RRMA 3–4	RRMA 5–7
Acute myocardial infarction	1. Immediate diagnosis. 2. Initiation of care, (oxygen, IV nitrates, morphine). 3. Immediate referral via specific coronary retrieval team. 4. Post-coronary follow-up and coordination of secondary prevention activities. 5. Participation in local divisional group health promotion and disease prevention programs.	1. Immediate diagnosis. 2. Initiation of care, (oxygen, IV nitrates, morphine). 3. Preparation for admission, pathology and assessment of status for definitive treatment (thrombolysis, arrhythmias). 4. Management of definitive care or preparation for transfer to tertiary centre. 5. Management of complications, arrhythmias, etc. 6. Review and management of post-coronary state, rehabilitation coordination. 7. Management of ongoing secondary prevention program. 8. Initiation and supervision of community health promotion and disease prevention programs.	1. Immediate diagnosis. 2. Initiation of care, (oxygen, IV nitrates, morphine). 3. Preparation for admission, assessment of status for definitive treatment or transfer to major centre in the absence of immediate pathology access. 4. Management or initiation of definitive care or preparation for transfer to tertiary centre. 5. Immediate management of acute complications, arrhythmias, etc. 6. Management and advice of community and family responsibilities, especially in indigenous communities. 7. Review and management of post-coronary state, and rehabilitation coordination. 8. Management of ongoing secondary prevention program. 9. Initiation and supervision of community health promotion and disease prevention programs.
Acute appendicitis	1. Immediate diagnosis. 2. Referral to surgeon or public facility.	1. Immediate diagnosis. 2. Immediate ordering of pathology tests and confirmation of diagnosis. 3. Assessment of surgical risk. 4. Assessment of anesthetic risk. 5. Preparation and transfer of patient to major centre if risks too substantial for immediate care. 6. Completion of surgical or anesthetic procedure. 7. Management of acute complications. 8. Ongoing postoperative care.	1. Immediate diagnosis in the absence of pathology tests 2. Assessment of surgical risk. 3. Assessment of anesthetic risk. 4. Preparation and transfer of patient to major centre if risks too substantial for immediate care or if in solo practice. 5. Completion of surgical or anesthetic procedure (if not in solo practice). 6. Management of acute complications (if not in solo practice). 7. Ongoing postoperative care.
Acute psychosis	1. Immediate diagnosis. 2. Acute referral to specialized psychiatric facility. 3. Post-discharge shared care with specialized mental health team or psychiatrist.	1. Immediate diagnosis. 2. Initiation of legal process of certification. 3. Initiation and management of acute therapy, chemical or physical restraint. 4. Preparation for retrieval to specialized psychiatric facility (may involve administration of general anesthetic prior to RFDS retrieval). 5. Management of social and family consequences within community. 6. Post-discharge ongoing care and management, (may be with intermittent allied health and mental health services).	1. Immediate diagnosis. 2. Initiation of legal process of certification. 3. Initiation and management of acute therapy, chemical or physical restraint. 4. Preparation for retrieval to specialized psychiatric facility (may involve administration of general anesthetic prior to RFDS retrieval). 5. Management of social and family consequences within community. 6. Post-discharge ongoing care and management, (may be with seldom or intermittent allied health and mental health services).

RRMA = Rural Remote Metropolitan Area Index; IV = intravenous; RFDS = Rural Flying Doctor Service.
*RRMA is a classification from 1 to 7 (1 = capital city, 7 = remote township or community of population < 1000).

Table 4. Effectiveness in achieving workshop learning objective: "to enhance a joint understanding of the different and specific issues in risk management in the rural and remote context and to progress a working framework for risk management applicable to the context of rural and remote medicine"

Effectiveness rating	No. of respondents (and %); *n* = 19
Slightly effective	2 (11)
Effective	9 (47)
Highly effective	5 (26)
Extremely effective	3 (16)

achieved its effect by raising awareness of the issues and that it may at least have value as an educational tool both for existing practitioners and for potential rural doctors. Further, we believe it has a place in demonstrating that rural and remote medical practice is clearly and unavoidably different from metropolitan practice.

The process for implementation of the ARTS framework is under consideration. We anticipate that it can be refined, simplified and applied as a tool for many conditions across a range of contexts. The challenge will be the integration of ARTS into clinical guidelines for rural and remote practitioners as well as informing the safety and quality standards that will drive the censorial processes of a professional college.

There appear to be at least 2 areas of potential use, at least initially. One is educational — doctors who are potentially entering rural and remote practice, particularly those whose experience has previously only been in metropolitan practice, can use the framework (through the development of a simplified tool) for a range of simple medical conditions. They can compare and contrast risk and risk management between major metropolitan and rural and remote sites, for example, in Australia, between Double Bay and Dubbo, or between Toorak and Theodore (the former are in metropolitan Sydney and Melbourne, respectively, and the latter are in rural New South Wales and Queensland, respectively). In its simplest form, the framework can remain as a useful *aide memoir*, particularly for doctors in training and those new to the practice of rural and remote medicine.

Second, with the proliferation of guidelines for best practice for a range of conditions, the framework will allow rural practitioners to develop the tools to demonstrate that guidelines arising from metropolitan environments are not necessarily applicable to all contexts and that "best practice" is context dependent. As a root-cause analysis framework, ARTS can be used to collect the hard evidence needed to support rural and remote best practice, to support existing rural practitioners against legal challenge and to assuage the fears of budding rural practitioners, particularly those with a procedural interest. If it achieves only this, it will be worth the effort invested in its development thus far.

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