

# Rural Mobile Simulation-Based Trauma Team Training—An Innovative Educational Platform

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**Learning Objectives:** 1) To provide an appreciation of the team behavioral skills required, in addition to the application of trauma life-saving skills, in the initial management of trauma patients. 2) To know the key points of trauma resource management. 3) To know the objectives of the Victorian Multidisciplinary Trauma Resource Management course. 4) To understand the challenges/barriers of delivering mobile simulation, scenario-based education in actual working environments. 5) To provide an appreciation of the challenges experienced by rural health care professionals—nurses, doctors, and paramedics—in accessing high-quality trauma education in rural areas. 6) To learn possible ways to overcome the identified challenges/barriers to rural trauma education.

## Abstract

This article outlines the development, implementation, and evaluation of the Victorian Multidisciplinary Trauma Resource Management (VMTRM) course, an innovative, simulation-based program developed to provide multidisciplinary trauma training to doctors, nurses, and paramedics within their local working environment in rural Victoria, Australia. The course was designed to address a number of identified barriers to trauma education for rural practitioners; in particular, geographical distance, limited access, lack of flexible delivery methods, and lack of multidisciplinary focus. Six 1-day and six 2-day simulation-based multidisciplinary trauma team training courses were held in rural health care facilities during the period 2003–2004. The courses provided 204 rural health professionals an opportunity to learn and practice the technical skills necessary for the initial stabilization of

trauma patients as well as the important Team and Trauma Resource Management skills necessary to effectively manage the acutely injured patient in the context of the Victorian State Trauma System. Independent evaluation of the course revealed an improved understanding and application of the principles of Trauma Resource Management as well as an appreciation of, and commitment to, multidisciplinary approaches to trauma care. Participants felt more confident in dealing with trauma and reported the initiation of changes in their workplace to improve trauma management. We believe this mobile simulation-based multidisciplinary trauma team training course is an effective way to provide trauma education for rural health professionals in their own environment.

Resuscitation of the multiply injured patient is one of the most complex challenges facing health care professionals in any setting. This complexity is often compounded by life-threatening injuries, usually under time-critical conditions, with little information regarding the incident or the potential diagnoses. To meet these complex needs, multidisciplinary health care professionals responsible for the initial management of these patients need both sound technical skills and a coordinated team response. In the context of trauma management, there is evidence to suggest that an effective team response improves patient care, reduces clinical error, and improves patient outcome.<sup>1-3</sup>

In the Australian state of Victoria, the single most common cause of trauma is motor vehicle crashes. Road trauma remains the leading cause of death among young people in the 15- to 24-year-old age group. The estimated number of trauma deaths in Victoria at the scene or in-hospital during July 1, 2003, through June 30, 2004, was 1,060 cases. The rate of in-hospital trauma deaths is 12.5% of all trauma patients.<sup>4</sup>

As is true in much of Australia, access to tertiary service health care is problematic in rural areas. A review of motor vehicle trauma outcomes in Victoria during 2001–2003 demonstrated an overall preventable/potentially preventable death rate of 29%. In rural hospitals, the challenges of trauma care may be compounded by longer transport times, limited resources, limited case load (leading to a lack of familiarity), and limited or no access to trauma education for health care professionals. Consequently, the reported preventable/potentially preventable death rates in rural areas are up to three times greater than this overall figure.<sup>5</sup> The necessity of effective multidisciplinary approaches to trauma education in rural Victoria is clear.

The need for trauma education to support multidisciplinary health care professionals working in rural communities is further highlighted in three strategic reports: the Review of Trauma and Emergency Services<sup>6</sup> report, the Consultative Committee on Road Traffic Fatalities,<sup>5</sup> and the Major Trauma Management Study.<sup>7</sup> These reports identified a number of technical skills that were problematic in rural areas. Issues such as airway management, chest decompression, fluid resuscitation, and care of the head-injured patient were seen as causes leading to preventable or potentially preventable trauma deaths. Similarly, deficiencies in team skills were identified, including delays in decision-making and the transfer to definitive care. These reports also highlight the need to develop an appropriate model for training multidisciplinary teams in rural areas and incorporating the use of innovative educational processes, such as mobile simulators and telemedicine.<sup>1,6</sup>

This article outlines a pilot project: the development, implementation, and evaluation of the Victorian Multidisciplinary Trauma Resource Management (VMTRM) course. As an extension of

This project was funded by a grant from the Victorian Trauma Foundation. None of the authors have any conflicts of interest to report.

Southern Health Simulation and Skills Centre’s (SHSSC) previous work,<sup>8</sup> this course was designed specifically to address trauma life-saving skills and effective team behaviors in a rural context. It provided opportunities for multidisciplinary team training to combine scenario-based learning with mobile patient simulation to practice technical and behavioral skills in actual work environments. Based on the principles of Trauma Resource Management (TRM) after Gaba et al,<sup>9</sup> the overall aim of the course was to teach rural health care professionals to stabilize and transfer trauma patients to an appropriate level of care in the shortest possible time frame, in the best possible condition.<sup>6</sup> The challenges that arose from the development, implementation, and evaluation of the course are also considered.

**Methods**

To address the issues (Table 1) identified by the reports, a multidisciplinary steering committee was established to develop the philosophy (Table 2) and objectives underpinning the course and provide oversight of curriculum development.

**VMTRM Course Objectives.** The objectives of the VMTRM course were to provide participants with:

- An improved understanding of the structured approach to trauma management,
- Improved teamwork skills through the principles of TRM (Table 3),
- An improved understanding of, and technical ability in demonstrating, trauma life-saving skills,
- An enhanced understanding of the roles of other professionals in the rural trauma team,
- Improved skills for ongoing professional development in trauma management, and
- An opportunity to apply concepts learned in the precourse learning package to a realistic trauma scenario.

The Victorian State Trauma System is geographically divided into six regions (one metropolitan and five rural) as determined by the State Government of Victoria’s Department of Human Services. Each of the rural regions has a regional trauma, emergency, and critical care coordinator. Their role encompasses trauma data collection and monitoring, implementation of the recommendations from the Ministerial Taskforce report (Review of Trauma and Emergency Services), development of effective trauma protocols and processes, and development of and participation in educational and research activities.<sup>10</sup>

As this was a pilot project, it was decided to conduct one 1-day and one 2-day course in each of the six trauma regions. The metropolitan region was included in these pilot series to evaluate the transferability of this learning approach to an urban context. The 1-day course was designed so that it could be delivered as an independent course or as the first day of the 2-day course. This flexibility was necessary to address the problem of backfill in a limited rural workforce.

To ensure that the courses were highly relevant to the needs of rural health care professionals, engagement of rural stakeholders was crucial to the success of the program. To that end, the first stage of the project involved the recruitment and training (see later discussion) of a total of 30 predominantly rural nurses, doctors, and paramedics as course facilitators. The role of the rural facilitators was to assist in VMTRM curriculum development, assist project staff from SHSSC in the delivery of the VMTRM courses, and to evaluate the VMTRM course from the perspective of a course facilitator

As an essential initial phase of the project, course facilitators undertook training in simulation-based education. This consisted of two 2-day courses: the first focused on course development, building on skills in facilitating adult learning, and content delivery for the 1-day VMTRM course; the second course focused on developing the facilitators’ understanding of human error and error management, team dynamics, simulation-based training, advanced facilitation skills, and content delivery of the 2-day VMTRM course.

<b>Table 1. Some Identified Areas for Ongoing Improvement in Rural Trauma Management*</b>	
<b>Prehospital</b>	<b>Emergency Department</b>
Undue prolonged scene time	Inadequate fluid resuscitation
Failure to scoop and run	Inadequate blood transfusion
Inappropriate hospital triage	Inadequate ventilatory resuscitation including failed intubation
The hospital was not notified of impending arrival	No or delayed chest decompression including misplaced intercostal catheters
No intubation was attempted despite the availability of trained paramedics	Inadequate monitoring, observations, arterial blood gas analysis, oxygen and perfusion
Respiratory/ventilatory resuscitation was inadequate	Inadequate management of hypothermia
Chest decompression for tension pneumothorax was either not performed or delayed	Delays in dispatch to another hospital
Fluid resuscitation was inadequate	Delays in diagnosis—abdominal and serious chest injuries
Sedation was excessive	Failure to appreciate the severity of injury—missed chest and skeletal injuries
Hypothermia was not adequately managed	
Documentation was inadequate	

\*Adapted from Consultative Committee on Road Traffic Fatalities.

<b>Table 2. Philosophy of the VMTRM Course</b>
<ul style="list-style-type: none"> <li>• Based on principles of adult learning</li> <li>• Trauma patient centered</li> <li>• Espouses the principles of Trauma Resource Management</li> <li>• Flexible delivery</li> <li>• Multidisciplinary</li> <li>• Rural input and ownership</li> <li>• Complementary to existing courses</li> <li>• Scenario-/simulation-based</li> </ul>

**Table 3. Key Points of Trauma Resource Management\***

- Know your environment
- Take a leadership/followership role
- Anticipate and plan ahead
- Communicate early, communicate effectively
- Call for help early enough
- Distribute the workload and use all available resources
- Allocate attention wisely—avoid fixation
- Reflect, support, improve

\*Adapted from the work of Howard et al.<sup>19</sup>

**Table 4. Overview of Day 1 and Day 2 Courses**

Day 1	Day 2	
Welcome, introduction, and overview	Welcome, introduction, and overview	
Structured approach to trauma management	Human performance and Trauma Resource Management	
Overview of Trauma Resource Management	Familiarization to the simulation environment	
The “Ted” scenario	Concurrent Sessions	
Reflection on learning from “Ted” scenario	Simulation of “Ted” scenario debrief	Workshop 1- Trauma and Resource Management
The block game—a communication exercise	Simulation of “Michelle” scenario and debrief	Workshop 2- Trauma team approach to managing multiple patients
Trauma patient preparation for transfer to definitive care	Reflection on learning	
The “Michelle” scenario	Evaluation	
Reflection on learning from “Michelle” scenario		
Evaluation		

In addition, four education consultants were recruited to assist with multimedia and precourse learning development.

**Curriculum Development.** To ensure that the most current information was included in the curriculum, the project steering committee sought assistance from a panel of experts in course development, simulation, and trauma education. An extensive literature search using CINAHL, PUBMED, MEDLINE, and EMBASE (search words: education, multidisciplinary team training, simulation, trauma) was unable to locate any publications describing the development of a trauma curriculum that was multidisciplinary and addressed both procedural and team skills. The course development process was informed by a report on trauma education requirements in Victoria, the Victorian Trauma Education Framework<sup>1</sup>; contemporary theories of adult learning<sup>11-14</sup>; an analysis of multidisciplinary roles within trauma teams in the context of the Victorian State Trauma System; and a review of existing trauma courses, including target participants, curriculum content, delivery

methods, duration, and cost. This review was aimed at ensuring the VMTRM courses addressed gaps in existing trauma curricula and to minimize repetition within the Victorian Trauma Education Framework.

Development of the curriculum for the VMTRM course was a staged process. The content of day 1 was developed and piloted in six 1-day courses, one in each State trauma region. The focus was on the acquisition of the knowledge and skills necessary for the initial stabilization and transfer of the trauma patient, in the context of the Victorian State Trauma System.

The next stage involved development of the day 2 content, which focused on effective trauma team behaviors to complement life-saving skills (Table 4). Six 2-day courses were piloted, one in each state trauma region.

**Participant Enrollment.** The course was open to all health care professionals in rural areas: doctors, nurses, and paramedics. Participants enrolled in the courses by completing a registration brochure disseminated across the six trauma regions by the regional trauma, emergency, and critical care coordinators and through local advertising and hospital networks.

**Precourse Learning and Mentorship.** A prelearning package included an overview of the course, core content to be covered, and resources to provide participants with self-directed learning opportunities in the form of key readings and web sites relevant to trauma management. Course participants were allocated a local mentor from the group of newly trained rural facilitators. The aim of allocating a mentor was to provide a point of contact before the course, to promote regional trauma support networks, and to foster ongoing local learning.

**Outline of the Day 1 VMTRM Pilot Course (Table 4).**

Following a brief welcome and outline of the objectives of the course, participants were given a semididactic interactive session that gave an overview of the Victorian State Trauma System, reinforced the importance of a systematic approach to stabilization, introduced the concept of the multidisciplinary rural trauma team, and introduced the principles of TRM (Table 3).

The key learning activities of the 1-day course centred on two scenario-based exercises involving the management of two trauma “patients.” The first patient, “Ted,” was a farmer who had fallen from the roof of his shed. This scenario provided the context for participants to review principles of prehospital trauma management, to examine and practice processes and skills required for the initial hospital management of major trauma patients, and to review the issues of transfer to a definitive care facility. More specifically, participants explored the management of head, chest, and major limb injuries.

The second patient, “Michelle,” was the driver in a high-speed, head-on car crash. This scenario placed greater emphasis on stabilization and preparation for transfer to definitive care. Additionally, participants explored the challenges of managing the hypotensive trauma patient with an emphasis on possible differential diagnoses.

Participants were divided by institution into multidisciplinary groups of up to eight, with each group being supported by facilitators and SHSSC staff. Using whole-body mannequin, part task trainers and live volunteers, participants “walked” through the phases of assessment and management of the trauma patient from the scene of the accident to the initial hospital reception and stabilization and preparation for, and initiation of, transfer to definitive care. Facilitators “paused” the scenario at various points to explore participants’ situation awareness<sup>15</sup> as well as to allow participants to practice various critical skills using part task trainers. This provided an opportunity for participants to ask questions, practice trauma life-saving skills, and discuss issues of team behaviors.

**Outline of the Day 2 VMTRM Pilot Course (Table 4).** The 1st day of the 2-day course consisted of the day 1 content previously described. The 2nd day of the course focused on the learning and practice of effective team behaviors required for a coordinated approach to trauma management; conceptual issues of human factors, including the effects of stress, fatigue, and fixation on error causation; concepts in team dynamics; principles of effective communication; and hazardous attitudes and assertiveness. The principles of TRM were revisited, allowing participants to consider and explore ways that the principles could assist them in their everyday practice, but especially in the context of the infrequent occasions when they are faced with the initial management of major trauma patients. Participants were then given the opportunity to apply these team behavior skills and technical skills learned and practiced during day 1 in a simulated real-time scenario using immersive simulation using a Medical Education Technologies Incorporated (METI, Sarasota, FL) Emergency Care Simulator or a Laerdal SimMan (Stavanger, Norway) in an actual clinical environment. Debriefing sessions using video and audio playback of the scenario allowed participants to reflect on and discuss issues that they had experienced in terms of both medical/technical and TRM issues. Debriefing was facilitated by SHSSC staff with rural facilitators as observers. The day concluded with a facilitated reflective session on the learning outcomes for the course overall.

**Evaluation.** Subsequent to appropriate ethics approval, both process (course development) and impact (participants' experience) evaluations were undertaken by the Centre for Health Research and Practice at the University of Ballarat during the period of course delivery. Eight written surveys were administered. Topics evaluated by these surveys included precourse learning packages for both facilitator development courses, participation in the facilitator development courses, precourse learning packages for course participants, and evaluation of the participant's experiences of the 1- and the 2-day courses. Responses to the survey were voluntary and implied consent to participate in course evaluation. A random sample of participants received a follow-up telephone interview at 3 to 6 months after completing the 2-day course. Outcomes are presented in the "Results" section.

## Results

A full copy of the final evaluation report<sup>16</sup> is available by request from the authors. The key findings are summarized here.

**One-Day VMTRM Pilot Courses.** A total of 81 participants completed the pilot 1-day courses (68 nurses, 11 doctors, and 2 paramedics). Fifty-two percent of participants provided feedback by way of an anonymous postal survey. Eighty percent of respondents agreed that the stated learning objectives had been achieved. Forty-eight percent of respondents reported a significant improvement and 36% of respondents reported a moderate improvement in their understanding of the important principles and requisite life-saving skills required in a structured approach to the management of trauma. In addition, 50% of respondents strongly agreed and 38% of respondents agreed that they gained a good understanding of the principles of TRM during the course. Some comments provided by participants included:

"Overall better understanding of trauma management—12 months prior had completed (another course). Your 1-day course actually helped to bring the whole trauma management thing together—a few more pennies dropped...!"

"Notify major trauma service early and use as a resource."

"The importance of acknowledging...multidisciplinary team triage assessments. To listen. To continue reassessing at every stage.

The games were useful in highlighting the need for team work... By doing regular 'hands on' exercises helped me learn and retain knowledge."<sup>17, p27</sup>

**Two-Day VMTRM Pilot Courses.** A total of 123 participants attended the 2-day courses (81 nurses, 31 doctors, and 11 paramedics). One hundred six participants (response rate, 86%) returned anonymous postal evaluation surveys to the University of Ballarat. In their final report, the evaluation team stated that the course was rated exceptionally high: "...participants were effusive in their praise of the quality of the course and the standard of facilitation."<sup>17, p6</sup> Ninety-one percent of respondents reported that the session on managing more than one trauma patient at a time motivated them to reevaluate personal and hospital disaster plans following their attendance at the 2-day VMTRM course. Seventy-three percent strongly agreed and a further 23% agreed that the course was relevant to their professional development needs. Ninety-seven percent of respondents reported that they had a greater understanding of the technical skills required to manage trauma patients. Improvement in participants' capacity to effectively contribute as a team member was reported by 97% of respondents. Of interest, only 57% of participants who responded were aware of a dedicated trauma advice and referral telephone number available to rural trauma health care professionals to expedite the process of referring and transferring major trauma patients to a designated Major Trauma Service.<sup>6</sup> Of the respondents who were aware of the advice and referral telephone number, 58% reported that they had not had the opportunity to use it, whereas 12% had used this service. Ninety-six percent of respondents rated the overall course as being of high quality.

**Qualitative Data.** Qualitative feedback from respondents revealed the following insights:

"Greater awareness of effective communication and leadership roles."

"Greater insight into other disciplines."

"How being focused on something can cause you to miss something that can be important or life threatening."

"Improved my confidence in understanding and completing the initial assessments...re-assessing the ABCs...The simulation was a great learning tool also."

"Importance of early dispatch to Major Trauma Centres.... Anyone can call the trauma number anytime."<sup>17, p38</sup>

Concluding comments provided by participants who attended the VMTRM courses included:

"I have found both days to be very valuable and relevant to my job, simulation scenarios were a lot more realistic than I expected."

"The dedication, patience, knowledge, organization and presentation by the facilitators of this course was outstanding and I would encourage everyone I know who works in ED (Emergency Department) to attend if they can."

"Brilliant course run by equally brilliant people. Absolutely essential in establishing/maintaining safe care of trauma patients in sub-trauma centres."

"The course was of great benefit to my learning. It got me really interested in wanting to learn more about how major trauma hospitals actually survive.... The paramedics are just so great!! New found respect for everything they cope with before coming to ED."<sup>17, p40</sup>

## Discussion

The evaluation data indicate that participants in the VMTRM courses have changed their view of trauma management as a result of their participation. Some comments from telephone interviews conducted 3 to 6 months following completion of the 2-day courses were:

“Yes it has changed the way I think; we are planning to revamp the A and E (Accident and Emergency) Department.”

“Yes communication is better and we work more as a team.”

“Well we don’t have a funded and staffed A and E but since we’ve had the trauma education we have done scenarios involving paramedics and we’ve had other sessions to involve other staff in education to encourage others to upgrade their skills. It’s improved our confidence.”<sup>17, p41</sup>

Participants reported increased confidence in their ability to effectively and systematically manage multiply injured trauma patients using a coordinated team approach. There was also a raised awareness of the need for early disposition and referral to a Major Trauma Service.

**Challenges of Course Design.** One of the major challenges of course design lay in attempting to include input from nursing, medical, and paramedic disciplines. Each of the craft groups had different approaches to learning and teaching, different perspectives and emphases on how to assess trauma patients based on their current work practices. To overcome this, the course was based on a broad goals/principles approach to the structured assessment of the primary/secondary survey informed by the Emergency Management of Severe Trauma/Advanced Trauma Life Support guidelines.<sup>18</sup>

**Challenges in Participant Recruitment.** Initial estimates of course registration fees, based on a “cost recovery” model, were prohibitive for rural health care professionals. Recognizing that high cost has been cited as one of the six principal barriers to rural trauma education,<sup>1</sup> the Victorian Trauma Foundation underwrote the cost of the course to make the actual participant fee manageable. The issue of subsidizing and sustaining high-quality trauma education in rural areas remains problematic.

Furthermore, ensuring appropriate representation of each craft group in each course was an ongoing challenge. The original intention was to enroll 6 doctors, 6 paramedics, and 12 nurses in each course. Recruiting sufficient paramedics proved to be problematic as attendance at this course was not considered as part of their paid scheduled training time. Similarly, recruiting sufficient numbers of doctors was challenging because of the limited availability and high cost of temporary medical staff in rural areas and clinical workloads.

**Challenges with Going Mobile.** The challenges associated with conducting the course in actual rural clinical environments are summarized as follows: 1) transport of equipment required for simulation and skills training; 2) logistics in relation to audiovisual set-up and using clinical environments for simulation-training; 3) availability, legal requirements, and safety issues surrounding the consumables, drugs, and equipment used for simulations; 4) equipment security; and 5) occupational and safety considerations for SHSSC staff and facilitators during course set-up, delivery, and pack-down.

The logistics of transporting large amounts of equipment required for trauma simulation and skills training involving videotaping and reflective debriefing of scenarios were significant. Some of the strategies employed were as follows:

Prior to each course, contact was made with hospital management, engineers, and security to ensure that adequate logistical and security support was available and to ensure course equipment would not cause electromagnetic interference with hospital equipment. Individual site visits were conducted to ensure the suitability of the proposed venues for the setting up of the necessary audiovisual equipment and the simulation mannequins.

All the equipment for each element of the course, skills stations, and simulation scenarios was packed into individual crates to ensure there was sufficient duplication of equipment and consumables available at all times. Wherever possible, consumables (including

injectable drugs) were sourced locally and reimbursed from VMTRM project funds. This served to avoid the potential risk to patients of leaving out-of-date stock (typically used in nonclinical simulation training environments) in a clinical environment. This strategy had the additional benefit of participant familiarity with local equipment and pharmaceutical brands.

All the necessary equipment, including a mobile simulator and the purpose-built audiovisual system required to conduct the VMTRM courses, was able to be transported safely in a small commercial van. To minimize the risk of injury, a coordinated team approach and the use of trolleys was used when lifting/moving/loading or unloading any equipment.

**Staffing Challenges.** Scenario-based simulation training is inherently labor-intensive in terms of skilled staffing requirements, with a need for a high facilitator-to-participant ratio. Therefore, recruiting suitably qualified and experienced rural trauma clinicians with additional skill in education was necessary. The project team provided comprehensive facilitator training to build capacity within the trauma regions to assist in the development and the delivery of the VMTRM courses. At each course, a SHSSC staff member and a rural facilitator worked together with up to eight participants. This provided a platform of support and mentorship for rural facilitators in the conduct of a new, innovative, and multidisciplinary trauma curriculum.

**Principles of TRM.** The principles of TRM (Table 3) were adapted from the work of Howard et al<sup>19</sup> in crisis resource management. The key points relate to management of self and other resources during a challenging clinical situation. However, an additional key point—“Reflect, support, improve”—was added to encourage ongoing learning from experience, to support trauma colleagues to minimize professional isolation, and promote continual improvement in trauma management. Overall, TRM principles gave participants a framework to practice and develop effective team behaviors. Particular emphasis was placed on concepts of team leadership, communication, and prioritization that are necessary to turn individual clinical decisions and actions into effective team responses.

Participants gained an improved understanding of the principles of TRM through scenario-based learning, realistic trauma simulations, and reflective group debriefing sessions aided by audiovisual playback.

**Flexibility of Course Design/Delivery.** The VMTRM courses were designed to be flexible and responsive to individual learning needs. The participants undertook a trauma learning needs analysis as part of the registration process for the course (Appendix 1). The VMTRM project team and rural facilitators then incorporated these responses into their course preparation and delivery.

**Limitations of the Evaluation Data.** The research design was descriptive, nonexperimental, and used posttests only. No pretests were conducted; therefore, changes in knowledge, skill, and team behaviors as a result of the course were not objectively evaluated. In addition, survey tools were not subject to statistical validity and reliability testing; only face validity was established.

Evaluation data relate only to those respondents who returned the survey forms. The response rate of 52% for the 1-day VMTRM pilot courses is less than the 70% minimum response rate accepted when surveying professional populations,<sup>20</sup> so outcomes from the 1-day courses cannot be generalized to all the rural health care professionals who attended this course. Those who chose not to participate in the survey may have had a different view or experience. By contrast, the 86% response rate from participants who attended the 2-day VMTRM courses constitutes a valid sample and therefore is representative of those who attended the 2-day VMTRM courses.

One component of the original evaluation matrix was to evaluate the impact of the VMTRM course on trauma outcomes in each region. It was realized early in the project that the anticipated number of participants for the VMTRM courses was too small to show statistical significance on trauma patient outcomes; therefore, it is not possible to attach statistical significance with respect to the wider population of rural trauma health professionals.

**Recommendations.** Based on the results of the comprehensive evaluation of this program, the VMTRM project team recommends the following:

1. One 2-day VMTRM course should be delivered in each trauma region in Victoria per year, and consideration should be given to the provision of one or more 1-day courses in each region to meet the needs of health care professionals unable or unwilling to attend a 2-day course.
2. The cost of course delivery should be subsidized by either corporate or government funding to ensure affordability for course participants.
3. The VMTRM 2-day course should be included as part of rural paramedic training.
4. Integration and coordination of current trauma courses including the VMTRM 2-day course should be included in the Victorian Education Framework.

**Future Directions.** Any future plans in relation to this pilot project await further discussions with the State Government of Victoria, in accordance with Recommendation 10 of the Clinical Skills Education Requirements of the Health Professions in Victoria report, which states: “The results of the Victorian Road Trauma Foundation mobile simulation-based training program pilot ... will be considered before any future commitment can be made about mobile training units.”<sup>21</sup>

## Conclusion

Based on an independent evaluation, the VMTRM course is an innovative, multidisciplinary educational platform, founded on a sound educational philosophy<sup>17</sup> that effectively meets the learning needs of multidisciplinary rural trauma health professionals. Specific outcomes included an increased understanding of the application of the technical skills and team behavioral skills required to effectively manage the major trauma patient in rural areas of Victoria. Participants reported increased confidence in dealing with trauma, and have initiated workplace changes to improve trauma management on a local level.

The evaluation demonstrates the success and value of these courses to rural health practitioners as a way to experience multidisciplinary simulated trauma team training in their own working environments.

## Acknowledgments

We thank the following for their assistance in making this article possible: Regional Trauma, Emergency and Critical Care Coordinators; Victorian Trauma Foundation; steering committee members; rural facilitators of the VMTRM pilot program; Ms. Belinda Powell, project support officer; Dr. John McDonald and Nicole Campain, University of Ballarat, for the independent evaluation; staff at Southern Health Simulation & Skills Centre; Laerdal Australia, Pty Ltd., for the loan of equipment during the initial set-up of the project; the education consultants recruited to assist with precourse learning development; Dr. David Smith for multimedia development; and participants of the VMTRM courses.

## Appendix

### 1. Trauma Learning Needs Analysis

I am a

- nurse       paramedic       doctor

My general learning needs include:

- Victorian State Trauma System
- Principles of prehospital care
- The body’s response to trauma
- Mechanism of injury
- Structured approach to trauma management
- Stabilization and transfer of trauma patients
- Trauma Performance Improvement
- Airway management skills
- Management of breathing difficulties in trauma
- Management of the hypotensive trauma patient
- Primary Survey Skills
- Secondary Survey Skills

My 3 main (specific) learning needs are:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

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## Microsimulation (PC Simulation) in Emergency Health Care Learning and Assessment

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**Learning Objectives:** 1) To define microsimulation and macrosimulation and describe their strengths and weaknesses. 2) To describe and discuss the importance of debriefing and the challenges related to microsimulators. 3) To summarize the opportunities and challenges to using microsimulation as an assessment instrument and describe a solution to the problem of training health care personnel with microsimulation.

### Abstract

Microsimulators—simulators that run solely on a computer—allow for both practice and assessment of learning objectives at higher cognitive levels than written tests or even oral boards, in some cases. In a microsimulator, the learner is required to actively use knowledge and cognitive skills to investigate and treat computer-simulated cases that will respond appropriately to the treatment. Microsimulation provides a convenient and economical way for the learner to not only practice the approach to more common conditions, but also practice how to deal with some of the rarer conditions. This article describes characteristics, strengths, and weaknesses of microsimulators compared with other simulators. The challenges of, and solutions to, using microsimulators as assessment instruments are described and practical applications are discussed.

### Background

Simulation is now widely recognized as an important educational intervention that can reduce the number of human errors and prevent adverse events.<sup>1</sup> The number and types of learning objectives that can realistically be met with simulation has increased significantly with the introduction of microsimulators that allow learners to treat simulated patients on their PCs. Many of the breaches of protocols made during clinical care relate to a lack of knowledge about which algorithms to follow, errors in drug dosages, and faulty clinical reasoning,<sup>2</sup> most of which can be addressed by the use of microsimulators. Microsimulators allow for both practice and assessment of learning objectives at higher cognitive levels than written tests or even oral boards, in some cases. In the simulator, the learner is required to actively use knowledge and cognitive skills to investigate and treat computer-simulated cases that will respond

The author has a commercial affiliation with one of the companies named in this article.