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Essential Trauma Care: strengthening trauma systems round the world

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Summary Injury has become a major cause of death and disability world-wide. Systematic approaches to its prevention and treatment are needed. In terms of treatment, there are many low-cost improvements that could be made particularly in low- and middle-income countries to strengthen their trauma systems. These can be formalised under "Essential Trauma Care" programme, similar to other global programmes for major public health problems.

World Health Organisation (WHO), leading the initiative in this direction, convened a meeting at Geneva in June 2002, involving Injuries and Violence Prevention Department of the WHO, the Working Group for Essential Trauma Care of the International Association for Trauma and Surgical Intensive Care (IATSIC), representatives of other organisations and trauma care clinicians representing Africa, Asia, and Latin America. The meeting developed a preliminary list of Essential Trauma Care services and a model template for the skills and equipment needed to assure them. It is intended to be used to assist individual countries in planning their own trauma care services.

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Introduction

Injury has become one of the leading causes of death and disability throughout the developing world. In low- and middle-income countries combined, injury-related causes account for three of the top six killers in older children (aged 5-14 years) and for four of the top six killers in young adults (aged 15-44 years). Road traffic accidents alone are the second leading cause of death in young adults, second only to HIV / AIDS.³ In addition to deaths, injuries account for a considerable degree of disability. It is estimated that the various forms of injury combined account for 12% of the disability adjusted life years lost world-wide.⁶

Despite the significant toll of injury, policy responses for both prevention and treatment have been minimal. In terms of treatment, there are many low-cost improvements that could be made available to strengthen the care of injured persons.⁵ These could be made by developing an "Essential Trauma Care" (ETC) programme, similar to what has been done for other global health problems. Such a programme would seek to better define what trauma treatment services should realistically be made available to almost every injured person in a given area. This programme would then seek to develop ways to ensure the availability of these

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services by strengthening the inputs of: (i) training and manpower; (ii) supplies and equipment; and (iii) administration and organisation.

Such a programme would draw from two sets of prior accomplishments. First, the World Health Organisation (WHO) and others involved in international health have made considerable progress in improving health in the spectrum of developing countries by advancing the concept of essential services. These are services that have low cost and high yield and which realistically can be made available to almost everyone in a given population.⁵ Programmes for these services have included defining, refining and promoting these services, as well as providing technical input to countries to help improve capacity to deliver the services. Examples of essential service programmes include: the Essential Drug List, the Expanded Programme on Immunisations, the Global Tuberculosis Programme, and the Safe Motherhood Initiative.⁷

Second are efforts to improve trauma care in individual countries. As an example of this, the American College of Surgeons (ACS) Committee on Trauma has significantly advanced the care of the injured in the USA and Canada by creating and promulgating the advanced trauma life support (ATLS) course and by the publication *Resources for the optimal care of the injured patient*.^{1,2}

This 100-page book contains guidelines for what hospitals at varying levels should have in place for inputs such as staffing, continuing education, supplies, equipment, administrative functions and quality assurance programmes. It has, basically, utilised an essential services approach. Similar approaches have been utilised in other developed countries, but not yet in less-developed countries.

A combination of these approaches represents a way to improve care of the injured and to reduce the burden of injury-related death and disability in a cost-effective manner in developing countries. In order to address these issues, a WHO consultation meeting took place during 24-26 June 2002.

Meeting participants

In the main, the meeting represented a collaborative effort of the Injuries and Violence Prevention Department (WHO) and International Association for Trauma and Surgical Intensive Care (IATSIC)/International Society of Surgery (ISS). The participants included representatives of the Working Group for Essential Trauma Care of the IATSIC, which is an integrated society within the broader ISS. They also included representatives of the Injuries and Violence Prevention Department of the WHO. Other organisations represented at the meeting included the International Committee of the Red Cross and the World Federation of Societies of Anesthesiologists. Other departments of WHO

including Blood and Clinical Technology, and Management of Non-Communicable Diseases were also represented.

In addition to the members of IATSIC/ISS's Working Group for Essential Trauma Care, the meeting participants included trauma care clinicians from at least one country of Africa (Ghana, Kenya, South Africa, and Uganda), Asia (India and Vietnam), and Latin America (Mexico).

Before the meeting, participants were provided with the summary of objectives which the meeting hoped to accomplish and what preparations they should make before attending.

The agenda included few formal presentations and focused primarily on brain storming on the ideas and suggestions for the development of the Essential Trauma Care guidelines and plans for their eventual use.

Essential Trauma Care Resource Matrix

After a long discussion, the meeting participants agreed on the concept of Essential Trauma Care Resource Matrix. This matrix will be central to the ETC guidelines and will serve as a model template to assist individual countries to develop their own trauma service plans. It is recognised that some system of planning for trauma care services exists in virtually every country, usually on the part of the Ministry of Health and often with the involvement of other organisations. The Essential Trauma Care programme, with the resulting Resource Matrix, should be viewed as a way of strengthening future efforts.

ETC Resource Matrix contains brief descriptions

of what resources need to be available for the provision of specific elements of care at different levels of the health care system. A preliminary version of these was arrived at by consensus among the meeting participants. A specific matrix was derived for each of 14 elements of trauma care (Table 1).

For each, both initial emergency management and long-term definitive care were considered. These resource guidelines for each element will be refined in subsequent communications by the meeting participants and by other reviewers, both inside and outside the WHO. After sufficient refinement, a final version of the *Guidelines for the development of Essential Trauma Care services* will be produced. By way of example, a preliminary version of the resource guidelines for airway management is provided (Table 2).

Table 1 Elements for ETC Resource Matrix

- (1) Airway
- (2) Breathing
- (3) Circulation and shock
- (4) Diagnostic and monitoring
- (5) Head, brain injury, and neck
- (6) Chest
- (7) Abdomen
- (8) Extremity
- (9) Spine
- (10) Burn and wounds
- (11) Pain control
- (12) Trauma Team and Trauma Service Organisation
- (13) Rehabilitation
- (14) Infection control

Necessary elements

On the vertical axis of each matrix are listed the specific elements of trauma care that are needed. These are divided into two categories: skills and knowledge, and equipment and supplies.

Skills and knowledge imply that the staff members (medical, nursing, and others) have the requisite training to

perform such diagnostic and therapeutic activities safely and successfully. This implies not only requisite training in their basic education (school and post-graduate training), but also continuing education sufficient to maintain these skills.

Equipment and supplies imply that these items are available to all who need them, without consideration of ability to pay, especially in true life-threatening emergencies. This implies not only having them physically present in the facility, but also having them available in a timely fashion in an ongoing basis, where appropriate 24 h per day, 7 days per week. It thus implies that organisational and administrative mechanisms exist to replace depleted or expired stocks of supplies and medications quickly and to repair non-functioning equipment quickly.

Range of health facilities

On the horizontal axis of the matrix are listed the range of health facilities. It is acknowledged that the hard and fast division between different levels is somewhat artificial, with actual facilities representing a continuum rather than discrete categories. It is also acknowledged that the capabilities of each level vary significantly between different countries.

Working within these constraints, the meeting participants have utilised the following categories:

Table 2 Specimen of Essential Trauma Care Resource Matrix

	Basic	GP	Specialist	Tertiary
Airway: knowledge + skills				
Assessment of airway compromise	E	E	E	E
Manual manoeuvres (chin lift, jaw thrust, recovery position, etc.)	E	E	E	E
Insertion of oral or nasal airway	D	E	E	E
Use of suction	D	E	E	E
Assisted ventilation using bag valve mask	D	E	E	E
Endotracheal intubation	D	D	E	E
Cricothyroidotomy – needle or surgical	D	D	E	E
Airway: equipment				
Oral or nasal airway	D	E	E	E
Suction device: at least manual (bulb) or foot pump	D	E	E	E
Suction device: powered, electric, pneumatic	D	D	D	D
Suction tubing	D	E	E	E
Yankauer or other stiff suction tip	D	E	E	E
Laryngoscope	D	D	E	E
Endotracheal tube	D	D	E	E
Bag valve mask	D	D	E	E
Basic trauma pack	D	D	E	E
Magill forceps	D	D	E	E
Capnography and other advanced airway equipment	D	D	D	D

This example is for the skills and equipment for management of airway obstruction in injured patients. Similar matrices are developed for 13 other elements listed in Table 1. Basic: outpatient clinic, often non-doctor staffed. GP: general practitioner staffed hospitals. Specialist: specialist staffed hospital, usually having a general surgeon and possibly other specialties. Tertiary: tertiary care hospitals, often university hospitals, wide range of specialists. E: Essential; D: Desirable. See text for further details.

- *Basic (outpatient clinic and/or non-medical provider):* This includes the primary health care (PHC) clinics that are the mainstay of health care throughout much of rural areas of many low-income countries. These are almost exclusively staffed by non-doctor level providers, such as village health workers, nurses, and medical assistants. This category also includes outpatient clinic settings run by doctors, whether in urban or rural areas. In many cases, such settings represent the first access for injured patients to the health care system. This is especially the case for low-income countries where there are no formal emergency medical services (EMS). The guide- lines for trauma treatment related resources apply to these fixed facilities and not to mobile EMS. Guidelines for EMS are to be addressed in a related WHO publication.
- *General practitioner (GP) staffed hospitals:* This includes hospitals without full-time specialist doctors in general and, in the case of the ETC project, particularly those without a fully trained general surgeon. Such hospitals may not have operating theatre capabilities. When they do, surgery is usually performed by the GPs. These facilities are usually referred to as district hospitals in Africa and primary health centres in India. In some circumstances, particularly East Africa, medical assistants have been highly trained to act in the capacity of general practitioners, in some cases performing operations such as caesarean section. The facilities at which they work are more likely to fall in this category, rather than the 'Basic' designation.
- *Specialist staffed hospitals:* This includes hospitals with at least a general surgeon. Staff at such facilities may also include orthopaedic surgeon and other specialists. Such facilities have operating theatres. These facilities are usually referred to as regional hospitals in Africa, community health centre or district hospitals in India, or general hospitals in Latin America.
- *Tertiary care hospitals:* This includes hospitals with a broad range of sub-specialities. Such facilities are usually, but not exclusively, teaching or university hospitals. They usually represent the highest level of care in a country or large political division within a country.
- *Essential (E):* The designated item should be assured at that level of the health care system in all cases. As the Essential Trauma Care project covers the spectrum of facilities across the world, the E designation represents the least common denominator of trauma care, common to all regions, including even the most 'resource-challenged'.
- *Desirable (D):* The designated item represents a capability that increases the probability of successful outcome of trauma care. It also adds cost. Such items may not be cost-effective for the most 'resource-challenged' environments. Hence, they are not listed as Essential. However, for countries with higher resource availability, such items may ultimately be designated as Essential in their own national plans. Likewise, there are some services for which only low-cost physical resources would be required and for which training of the health care personnel at the particular level would be feasible. If it did not seem reasonable to assure such training nation-wide, such services were designated as Desirable.. Individual countries may wish to upgrade these to Essential.
- *Possibly required (PR):* In more resource-challenged environments, some trauma treatment capabilities might need to be shifted to lower levels of the health care system in order to increase their availability. Such services usually represent only minimal increased cost, in comparison to offering such services only at higher levels of the health care system. Shifting to a lower level in the health care system would usually imply that a provider with less advanced trauma-related training and skills would be performing procedures that might otherwise be performed by more highly trained personnel. Hence, it is to be emphasised that the PR designation is different from the Desirable designation. PR represents a potential necessity to increase availability of trauma care services in more 'resource-challenged' environments. It is anticipated that the PR designation will apply primarily to low-income countries, but not to middle-income countries.

In the development of national trauma plans, the authors anticipate that many countries may want to convert the Desirable category to Essential. The converse is not true. Items designated as Essential should remain that way except in extreme or very unusual circumstances.

Priorities

For each cell within the matrix, the meeting participants indicated those resources (vertical axis) that should be available at a specific level of the health care system (horizontal axis). For each item, the following designations were made:

Future steps

A preliminary list of Essential Trauma Care services and a preliminary set of resource guidelines in the

form of an Essential Trauma Care Resource Matrix were generated by the meeting. The next steps in the Essential Trauma Care project will include the following:

- Writing a draft of a formal publication entitled *Guidelines for the development of Essential Trauma Care services*. This will include clarifications and descriptions of the rationale behind the various components of the ETC Resource Matrix. It will also describe how the model template is to be used in planning for national trauma services. Sections are being written by several meeting participants and will be collated by Dr. Charles Mock, Chairman of IATSIC/ISS's Working Group for Essential Trauma Care.
- Circulating the draft for feedback. This will include the Executive Committee of IATSIC and the director of the Injuries and Violence Prevention Department at the WHO. It will also include feedback from others present at the meeting. Revisions of the draft will be undertaken based on this feedback.
- The draft will then undergo internal and external review as in keeping with standard WHO operating procedures. For internal review within the WHO, this will include, among other departments-Blood and Clinical Technology, Essential Drug Programme, and Management of Non-Communicable Diseases. For the external review, input will be specifically sought from representatives of organisations that have a stake or in the Essential Trauma Care programme or experience relevant to it. Inputs will be invited from the representatives of ministries of health and trauma care clinicians in several low- and middle-income countries.
- In addition to the standard WHO review and approval procedure, the guidelines will be presented to the membership of IATSIC for ratification. The deadline for this will be IATSIC/ISS's Biennial Congress in Bangkok, Thailand in August 2003.
- National pilot programmes. The ultimate utility of these guidelines lies in their ability to strengthen the care of injured patients in the real world circumstances of low- and middle- income countries. Hence, concurrently and especially after the final production of a manual of guidelines, the

ETC project seeks to undertake pilot programmes to assess the feasibility of development and implementation of national or sub-national trauma system plans utilising the model template contained within the ETC guide- lines.

Further details may be found in the publication *Report on the consultation meeting to develop an Essential Trauma Care programme*.⁴

Conclusion

WHO and IA TSIC led Essential Trauma Care initiative has achieved significant progress. This project is supported by a broad-based coalition of various stakeholders and will consider viewpoints from organisations and individuals from across the world to develop the formal guidelines for Essential Trauma Care. This, in turn, will hopefully assist individual nations at various stages of development, to upgrade their trauma systems, through systematic approaches to planning. It is anticipated that the goal of Essential Trauma Care for every injured person in the world can be achieved with implementation of global programme on Essential Trauma Care.

References

1. American College of Surgeons Committee on Trauma. Advanced trauma life support course for doctors. Instructor course manual. Chicago: American College of Surgeons; 1997.
2. American College of Surgeons Committee on Trauma. Resources for the optimal care of the injured patient. Chicago: American College of Surgeons; 1999.
3. Krug E, Sharma G, Lozano R. The global burden of injuries. *Am J Public Health* 2000;90:523-6.
4. Mock C, Peden M, Joshipura M, Goosen J. Report on the consultation meeting to develop an Essential Trauma Care programme. Geneva: World Health Organization [ref: WHO/ NMH/VIP/02.09]; 2002.
5. Quansah RE, Mock CN. Trauma care in Ghana. *Trauma Q* 1999;14:283-94.
6. The World Bank. World development report 1993: investing in health. New York: Oxford University Press; 1993.
7. WHO. WHO model list of essential medicines: 12th list. April 2002.