Applying the lessons of maternal mortality reduction to global emergency health

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Abstract Over the last few decades, maternal health has been a major focus of the international community and this has resulted in a substantial decrease in maternal mortality globally. Although, compared with maternal illness, medical and surgical emergencies account for far more morbidity and mortality, there has been less focus on global efforts to improve comprehensive emergency systems. The thoughtful and specific application of the concepts used in the effort to decrease maternal mortality could lead to major improvements in global emergency health services. The so-called three-delay model that was developed for maternal mortality can be adapted to emergency service delivery. Adaptation of evaluation frameworks to include emergency sentinel conditions could allow effective monitoring of emergency facilities and further policy development. Future global emergency health efforts may benefit from incorporating strategies for the planning and evaluation of high-impact interventions.

Introduction
Global health initiatives are fuelled by the extent of the associated public health need, the severity of the problem involved and the availability of feasible solutions to that problem. In general, the success of such initiatives depends on the organized, concerted and relentless advocacy of international stakeholders – to inspire continued dedication during an often long campaign. The global effort to reduce maternal mortality has benefited from such advocacy, as demonstrated by the progress made towards the achievement of Millennium Development Goal 5 – i.e. towards a 75% reduction of maternal mortality, from its 1990 level, by 2015.12 The global community’s approach to improvement in maternal mortality may be applied to other high-impact public health issues, including the delivery of all emergency services.

Compared with maternal illness, medical and surgical emergencies account for far more morbidity and mortality. However, efforts to improve comprehensive emergency systems globally have not achieved as much attention as the improvement of maternal health. Traditionally, attempts to improve the management of emergencies in low- and middle-income countries have been focused on the vertical delivery of health services such as trauma care or responses to obstetric emergencies.3 Questions have been raised about the adaptability and flexibility of emergency systems designed around vertical delivery models. For example, is unclear whether such systems facilitate an adequate response to the new and evolving needs of the communities to be served.4 More recently, efforts to develop and improve emergency systems in low- and middle-income countries have included limited horizontal approaches.5 Many of these efforts have focused on improving the care provided by ambulance services or other out-of-hospital care, formalizing training for care providers, improved transportation infrastructures and vehicles or the strengthening of public policy.6,7 Despite these inroads into the construction of horizontal emergency systems, there has been scant investigation of effective integrated packages of emergency services or of community engagement to strengthen emergency care. There has been insufficient dialogue on the design of an effective framework to identify, understand and improve areas of weakness in the general emergency systems of low- and middle-income countries.

The right to health has been endorsed by multiple international treaties and national constitutions.8–11 In most low- and middle-income countries, access to good emergency services during a patient’s greatest time of need remains a frequently overlooked but essential element of that right. The far-reaching effects of insufficient emergency systems and health care are particularly apparent in the context of the Ebola virus outbreak in west Africa.12 Despite the relative paucity of relevant literature on the building of good emergency systems, it has been estimated that integrated prehospital and in-hospital emergency systems could address 35–46% of morbidity and mortality in low- and middle-income countries.13 The burden of emergencies – like the burden of maternal illness – falls largely on low- and middle-income countries.13 Many of the lessons learnt from efforts to reach Millennium Development Goal 5 in low- and middle-income countries are transferrable to the critical barriers in the development of effective emergency systems. These lessons include the unified conceptual framework required to achieve a holistic understanding of the large morbidity and mortality burdens caused by emergencies of all types – infectious disease, noncommunicable disease and trauma. Such a framework is also a key element in the evaluation of impacts and the direction of any proposed interventions. To describe a potential framework, we used standardized terms that refer to certain aspects of emergency systems, services and care (Box 1).3,14

The three-delay model
The recent decrease seen in maternal mortality is a product of interdisciplinary efforts that used multiple approaches to increase service availability and remove financial barriers to care.15 An early model provided an invaluable framework
for understanding not only the factors contributing to the mortality resulting from obstetric emergencies but also the initiatives that may have most potential impact. A later model focused on the three main factors that affected the outcome of emergency presentation during pregnancy. These factors were defined, chronologically, as the lengths of the delays in: (i) the decision to access care, (ii) the identification of – and transport to – a medical facility, and (iii) the receipt of adequate and appropriate treatment. Socioeconomic and cultural factors, accessibility of facilities and quality of care may independently affect the lengths of these three delays (Fig. 1). This so-called three-delay model illustrated that maternal mortality was not due solely to a lack of economic and human resources but was a product of numerous interwoven factors. A poor patient outcome is likely to result if any of these factors contribute to an undue delay. For example, an inability to recognize an emergency may extend the delay in the decision to seek care. While the ability of the patient or a caregiver to recognize an emergency is partially dependent upon the patient’s or caregiver’s level of education, studies have shown that true obstetric emergencies may not be perceived as emergencies in areas where they commonly occur. Additionally, in various cultures, women’s status can affect both the ability of women to decide to seek care and their subsequent ability to reach care.

Transferability of the model

The established definition of general emergency services – as all efforts to provide services, in time-sensitive conditions, to patients and populations under extreme risk – may easily be extended to obstetric emergencies as conceptualized in the three-delay model. General emergency services are not restricted to the provision of medical interventions but also require timely action. In the three-delay model, the contributors to delays are not specific to emergencies during pregnancy but can be applied to emergencies in general (Fig. 1). The barriers posed by transport access, distance to care and gender-specific differences in cultural status, for example, are relevant to all emergency services. Similarly, the barriers posed by distance from health facility and the perception of the quality of services – which have been shown to increase the time it takes for a sick pregnant mother...
to access care— are common targets of programmes to improve the quality of care that the patient will receive does seem to have a strong effect on their decision to seek care. These findings have been recently validated, for all types of emergencies, among communities in rural Kenya and Zambia. The patient's or caregiver's perception of the quality of care that the patient will receive does seem to have a strong effect on their decision to seek care. These findings have been recently validated, for all types of emergencies, among communities in rural Kenya and Zambia.

Endocrine abnormalities or toxins. As infections, environmental conditions, threatening— fever has many possible

Effective emergency care is dependent upon the planning and organization of prehospital emergency services in the setting involved. Effective prehospital care— even in low-resource settings— improves survival by decreasing the time to treatment. Community-based first responders can reduce mortality and morbidity substantially, especially among trauma cases. In northern Iraq, for example, the mortality rates from penetrating trauma and land-mine injuries declined from 91% to 15% and from 28% to 9%, respectively, after community-based first responders were trained to provide field care for such traumas and to cooperate with paramedics when needed. If care delays are to be minimized, the individuals who provideprehospital services need to be able to identify the level of care that a patient requires and to take the patient directly to the nearest facility that offers that level of care. The delay in identifying and reaching a medical facility is dependent upon the recognition of a potentially severe condition will decrease the likelihood that appropriate care will be provided in a timely and effective fashion. Cost appears to be a less important barrier to utilization than other factors, especially when an emergent condition is present.

Critical time points

Seeking care

Effective emergency care is dependent upon the patient's or caregiver's ability to recognize that an abnormal condition exists, that the condition has a level of severity warranting intervention and that an intervention is available to treat the condition. Any slowness in the recognition of a potentially severe condition will decrease the likelihood that appropriate care will be provided in a timely and effective fashion. Cost appears to be a less important barrier to utilization than other factors, especially when an emergent condition is present.
assess the individual components of each critical intervention. For example, researchers who observe the effective administration of parenteral antibiotics in a facility may reasonably conclude that the facility has personnel who can choose appropriate antibiotics, give drugs intravenously and can administer the relevant tubing, catheters and medication. If any component of the signal function is absent, then that function cannot be accomplished and the system of care is deficient. This concept is particularly applicable to emergency care, where a concatenation of many events must often occur to produce the desired function. Checklists to help assess the capabilities of individual facilities in completing each signal function for maternal emergencies have already been developed and successfully deployed. The African Federation for Emergency Medicine has expanded the concept of generalized emergency sentinel conditions to include signal functions and their associated required supplies.

Validation of the resultant emergency-care assessment tool for health facilities is currently underway.

Lessons learnt

The recent focus on assuring the delivery of effective obstetric emergency care to reduce maternal mortality has led to the development of an intellectual framework that is largely applicable to global emergency health in its broadest terms. Although recent developments in obstetric care have much in common with potential developments in general emergency care, the inherent differences need to be appreciated. Specifically, obstetric care is centred on a physiological event that most often concludes with few complications and a new life. When they do arise, complications are usually limited to the time of gestation or birth. In contrast, emergency care provides essential care for pathological processes – including acute exacerbations of noncommunicable disease, acute infections and trauma – that can happen at any point in an individual’s life.

The natural time constraint of obstetric emergency care has often allowed interventional packages based on relatively simple solutions to be successful – although a more comprehensive functional system may be needed to have scalable effectiveness. Notably, a recent large multi-country survey by WHO revealed a substantial mismatch between good health outcomes and high coverage of essential health services. The mismatch was thought to be attributable to a shortage of comprehensive emergency care for women. In the absence of a comprehensive patient-centred approach, provision of a single element of care is unlikely to improve mortality or morbidity. Together, haemorrhage, sepsis and hypertensive emergencies cause 52% of maternal mortality but these are not just pregnancy-related issues as they can lead to mortality via the same pathways as emergency sentinel conditions. Consequently, interventions to treat these emergencies and others can strengthen entire emergency systems and lead to many improvements other than the expected reduction of maternal mortality. A broad emergency system that provides universal access to life-saving interventions...
is able to treat emergencies in pregnancy as well as trauma and medical emergencies.

We will need substantial infrastructural changes to emergency systems if each of the three main delays in emergency care is to be minimized. However, the multiple changes needed for a complete overhaul of emergency systems may not be possible to implement simultaneously, particularly in low-resource settings. Recent efforts to offer a roadmap to overcome neonatal mortality in low- and middle-income countries have focused on a few key strategies. The same strategies could be applied more broadly to emergency systems – by advocating for universal health care, making emergency services free to all, developing a system that provides a basic level of emergency care at community level, and developing strong monitoring programmes to assure that key emergency services are being delivered at health facilities. Such strategies could be pursued with those targeted practical interventions that have been shown to be markedly effective when focused on critical time points in the chain of survival. The most cost-effective initiatives tend to be those targeted at the delays in the decision to access care and in the identification of – and transport to – a medical facility. For example, education on the recognition of emergencies and how to access the appropriate level of care can be particularly effective but relatively inexpensive. Investment in the training of community members to assist with emergency identification and the transport of patients to appropriate care has been shown to significantly decrease mortality. The staff in the more basic health facilities can be trained to provide interventions that can sustain a patient’s life until the patient reaches a facility where definitive care is available. It is a common misconception that substantial investment in infrastructure at a health-care facility is required to accelerate access to appropriate care. In fact, the implementation of standardized emergency training courses – e.g. WHO's Emergency triage assessment and treatment training course – can lead to substantial reductions in mortality without any major investment in material infrastructure.

Conclusion

While prevention remains critical, treatment – within the context of a patient-centred supportive system – will be needed if we are to achieve large sustained reductions in death and disability resulting from emergency presentations. As with maternal health, emergency care requires not only that the patient or caregiver recognizes that a life-threatening or life-changing condition is occurring, and that there is a need to seek care, but also that timely access to adequate care is available. Given the unpredictable nature of health emergencies, there are few quick fixes. However, strong emergency systems can prevent delays at critical time points. Such systems do not require massive resource allocation but rather a cost-effective, informed approach that emphasizes the proven life-saving interventions that are appropriate to the context. Improving access to emergency care, by minimizing the three main types of delay in the delivery of such care, has the potential to reduce mortality in every field, system and population.

Competing interests: None declared.

Résumé

Appliquer les enseignements tirés de la réduction de la mortalité maternelle à la situation liée au traitement des cas d'urgence sanitaire au niveau mondial

Au cours des dernières décennies, la santé maternelle a figuré en bonne place dans les priorités de la communauté internationale et cela s'est traduit par une baisse considérable de la mortalité maternelle au niveau mondial. Or, même si la morbidité et la mortalité liées aux urgences médicales et chirurgicales sont bien plus élevées comparativement à celles associées aux pathologies maternelles, les efforts menés au
niveles mundiales. En el contexto de la atención al parto, el mejoramiento de la calidad de los servicios de salud para la madre puede conducir a un aumento en las tasas de mortalidad materna. La aplicación de los conceptos aprendidos en el campo de la atención al parto puede ser transpuesta a otros contextos de urgencia.

Resumen

Prácticas de atención a la salud en emergencias: experiencias y lecciones aprendidas

En este artículo se presentan las experiencias y lecciones aprendidas en el ámbito de la atención a la salud en emergencias, con el objetivo de mejorar los servicios de salud en situaciones de emergencia. Se destacan los desafíos y oportunidades que se presentan en el contexto de las emergencias, y se sugieren estrategias para mejorar la atención a la salud en estas situaciones.

Referencias


