

Who Should Treat the Wounded?

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The article by Ben-Abraham et al. in this issue of *IMAJ* [1] raises a serious question: Are the young men whom we assign to the front line to care for the wounded adequately prepared for this formidable task? Ben-Abraham et al. emphasize the dangerously limited experience of the subjects of their study — a select sample of enlisted soldiers (medics) trained during their military service to administer initial trauma care in the field — notwithstanding their recent participation in a concentrated preparatory course and a well-structured system of continuous education. A closely related issue of greater concern that the article fails to address regards reserve medics, upon whom the system relies in times of crisis. These individuals, who are called up from civilian lives that tend to be remote from a medical milieu, are likely to be even less reliable providers of trauma care than the newly trained medics in service.

We recently described a rapid linear cognitive knowledge decline among physicians graduating Advanced Trauma Life Support® courses [2]. The decline of knowledge was more evident in physicians than in surgeons. Surgeons, whose daily exposure to trauma care was greater than that of the physicians, retained their knowledge for longer periods [2-4]. Application of that finding to our present concern suggests that physicians, who have a better basic training than medics and are also likely to have more frequent and prolonged exposure to medical emergencies, should be better able to provide adequate trauma care. The American College of Surgeons has recognized that the caregiver's

experience is a crucial component of optimal treatment for the injured [5].

Adequate pre-hospital treatment of the wounded requires limited anatomical and physiological knowledge, a few simple protocols and algorithms, and limited manual skills [6]. Yet correct management of the injured patient in the pre-hospital setting can spell the difference between life and death, and between full recovery and permanent disability. Hence the question arises of whether to continue to use young medics with no previous exposure to trauma, and if so, how to assure the adequacy of their skills and maintenance of their competence? Alternatively, should well-trained physicians or paramedics replace medics? In most cases the latter option is impracticable, owing to the relative lack of highly trained professionals. In the case of the former, there simply are not enough physicians to carry the task. And even within the existing professional ranks, the exposure of the average physician to trauma is low, despite the fact that all physicians in the Israel Defense Force Medical Corps are required to take the ATLS®¹ course [4]. Paramedics, of whom there are very few in the IDF² Medical Corps, currently receive a much better basic training in trauma care owing to the inclusion of the Pre-Hospital Trauma Life Support® course. However, that course is civilian in its orientation, and is based mainly on the "scoop and run" — the "ten golden minutes" — concept [6]. The circumstances of military trauma care vary substantially from civilian

trauma care, particularly with regard to prolonged periods that frequently precede evacuation. Also, the exposure of paramedics stationed in remote military bases to trauma is as limited as that of medics.

The long-term solution will be a gradual replacement of medics by paramedics, starting at locations with a higher incidence of injury. Concurrently, measures will have to be taken to assure exposure to continuous education and practice. This can be accomplished by designating routine periods of training in mobile intensive care units and level I trauma centers. Those experiences will need to include close supervision and adequate instruction. Moreover, the caregivers' levels of cognitive knowledge and manual capacities should be periodically assessed in a formal process of re-certification.

For the next few years at least, the dominant providers of immediate care to the wounded in the IDF Medical Corps will continue to be the medics. How can we improve their capabilities? The first step will be to identify the most essential knowledge and skill objectives of trauma care. These will have to be taught repeatedly and periodically, using the best educational methods, aids and simulations [7]. Fewer sessions will be needed for review of theoretical subjects relative to the practice of manual skills. Part of the training should include the PHTLS®³ course, modified for relevance to military circumstances. A suggested name for the revised training might be "Combat Pre-Hospital Trauma Life Support Course"

¹ ATLS® = Advanced Trauma Life Support®

² IDF = Israel Defense Force

³ PHTLS® = Pre-Hospital Trauma Life System®

(CPHTLS). This of course will require permission of the PHTLS® copyright owners.

Periodic exposure of medics to trauma can be effected by repeated periods of service and training in trauma units, emergency departments and mobile intensive care units. These experiences should have precise educational objectives, in contrast to the current experience of medics during their single period of exposure to an emergency department where they resemble visitors on tour rather than caregivers. The technical difficulties that arise when "visitors" provide care, such as insurance against error, for example, should and can be overcome. The Hebrew name of the current course is the "Hovshim Course," which means the "dresser course." As is well known, dressings are of a very low priority in the early management of major trauma. That name should be changed to reflect the new

concept. "Life Support Provider" would be far more appropriate.

Finally, medics who fail to maintain rigorous standards of performance should be identified as soon as possible and dismissed from the unit that provides care to the injured. It is preferable to lack medical personnel than to accredit unfit personnel. Also, we should ensure that those who take care of critically injured patients are provided with the best tools to perform their service. These measures will reduce avoidable mortality, and decrease morbidity and disability.

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Capsule



First food-borne pathogen sequenced

Campylobacter has become a major health problem over the past 20 years, often passing from its natural avian hosts to humans through undercooked poultry or contaminated water. Now, *C. jejuni* has a new and more auspicious claim to fame: it is the first food-borne pathogen whose genome has been sequenced.

A team lead by Bart Barrell and Julian Parkhill at the Sanger Centre in Cambridge, UK, has determined the exact order of the 1.64 million bases that make up the pathogen's genetic code. The sequence has already revealed how *C. jejuni* might evade immune system detection — information that might help researchers develop vaccines to protect against the bacterium, which last year caused nearly 300,000 cases of food poisoning in the United States alone. It is also shedding light on an occasional aftermath of *C. jejuni* infections: the temporarily paralyzing neuromuscular disorder called Guillain-Barre syndrome, thought to be an autoimmune reaction touched off by the bacterium. What's more, because *C. jejuni* is a close relative of *Helicobacter pylori* which causes ulcers, comparing the two genomes should help researchers better understand that pathogen as well.

Microbiologists have found *C. jejuni* difficult to study because it grows poorly in the lab. But sequencing it proved

much less of a problem — taking less than 16 weeks from start to finish. Not all of *C. jejuni*'s potential genes have been identified, but those that have may solve some puzzles about the organism. For example, the Sanger group discovered repeated sequences of either guanine or cytosine bases — anywhere from 7 to 13 copies of each — in 25 of the microbe's genes. Such repeats are not unusual, but in this case they helped the researchers see how the bacteria might evolve to evade the host immune system.

These mutations primarily affect genes that help produce lipopolysaccharides. By frequently altering these genes, *C. jejuni* may change how its surface looks to the immune system, thereby avoiding recognition by antibodies produced during previous infections. Besides shielding the bacterium from an immune response, these similarities could cause trouble when the immune system does succeed in recognizing the camouflaged molecules. Wren reported preliminary experiments suggesting that one NeuB gene may cause a surface molecule on *C. jejuni* to look like a ganglioside. That close resemblance could trick the immune system into attacking nervous tissue as well as the invading bacteria, perhaps causing Guillain-Barre syndrome.

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