

Healthcare workers from a variety of disciplines did not initiate immobilisation of the cervical spine in 8 of 54 (15%) patients transported to hospital by ambulance, 24% of patients (14 of 58) in the emergency departments, and 10% (6 of 58) of those transferred to a tertiary care centre. The reasons for this are unclear but may include lack of awareness of healthcare workers of those at risk, paucity of suitable immobilising devices for small children, and an inability to maintain immobilisation in young, uncooperative patients.

Children with isolated head injuries or who had had falls were more likely to be overlooked for immobilisation than those in road crashes. All of these groups are defined as at risk in paramedic training and paediatric life support courses.^{3 4 9} The proportion of frontline staff who had received such training is, however, unknown.

Patients who were not immobilised were younger than those immobilised. This has important clinical implications in that the proportion of injuries to the upper cervical spine (vertebrae C1-C4) is higher in patients less than 12 years of age, and this carries a higher mortality than injuries to the lower cervical spine (23% *v* 4%).¹ This may partially reflect a perceived lack of immobilising options, as rigid collars are not available for infants less than 6 months of age. Spinal boards, sandbags, and tapes are a recommended alternative by paramedic training and paediatric life support courses.^{3 4} A combination of two or more devices is recommended in unconscious patients; however, only hard collars are recommended for agitated patients.^{3 4 10} These recommendations potentially leave infants less than 6 months unprotected but is unlikely to be a major factor in our non-immobilised patients, given their median Glasgow coma score of 7 on presentation.

Radiological clearance

A high proportion of patients were cleared of spinal injury by radiological evaluation and had the immobilising device removed at the local hospital (16 of 46, 35%). A reduced level of consciousness precluded adequate clinical examination in 14 of these patients, yet immobilisation was removed on the basis of a lateral radiograph of the cervical spine only. This view misses 26% of bony cervical spine injuries.^{11 12} Both multiviews and spiral computed tomography, although acceptable for ruling out bony injury, will not show spinal cord injury without evidence of abnormality on radiographs. A normal clinical examination excludes most injuries to the cervical spine.⁸ If this cannot be performed immobilisation should be maintained even though radiological findings are normal.⁷

Study limitations

The limitations of a retrospective study must be acknowledged. Data concerning immobilisation of the cervical spine of patients before arrival at hospital were collected from paramedic or ambulance sheets, which may have been incomplete, resulting in under-reporting. However, all cases were cross referenced with notes from the local hospital.

Conclusion

A deficit in the recognition and early management of children at risk of injury to the cervical spine occurs

across disciplines. This may be due to lack of appreciation of mechanisms of injury producing risk, confusion regarding the immobilisation of the cervical spine of infants, and failure to appreciate that clearance must be given only after an appropriate clinical examination regardless of any radiological investigation. Efforts to rectify this problem must include education of healthcare professionals and ambulance and emergency staff having ready access to immobilising devices that are appropriate for different ages.

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Endpiece

Medicine by numbers

In his factual account of cruising the South Seas in *The Cruise of the Snark* (1911) Jack London regretted that he had gone to a chemist's before stocking his medicine chest for the voyage. He would have done far better with a much simpler selection.

"I should have been far wiser, I know now, if I had bought one of those ready-made, self-acting, fool-proof medicine chests, such as are favored by fourth-rate ship masters. In such a chest each bottle has a number. On the inside of the lid is placed a simple table of directions: No. 1, toothache; No. 2, smallpox; No. 3, stomachache; No. 4, cholera; No. 5, rheumatism; and so on, through the list of human ills. And I might have used it as did a certain venerable skipper who, when No. 3 was empty, mixed a dose from No. 1 and No. 2, or, when No. 7 was all gone, dosed his crew with 4 and 3 till 3 gave out, when he used 5 and 2."

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