Use of tissue glue in field situations

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SUMMARY: Tissue glues are in widespread use in Accident & Emergency departments, and are simple to use. Results of closure of uncomplicated wounds using glue are comparable to traditional methods such as suture, 'sterile strips'. There are certain times in the field situation where evacuation of a casualty with a simple laceration could be impossible. These circumstances could be suitable for an individual suitably trained to effect wound closure using a tissue glue. This study simply set out to establish whether it was possible to train an infantry soldier how and when to close a wound using a tissue glue. A short period of instruction was followed by a practical session using wound simulators. It was found that the theoretical concepts and practical skills required to successfully glue a simulated wound were readily acquired by infantry soldiers, irrespective of their previous level of first aid training. The authors suggest that this concept should be pursued with the aim of field trials of cyanoacrylate tissue adhesives being carried out.

Introduction
Tissue glue has an established place in the management of uncomplicated wounds in the Accident & Emergency department, producing final results that are as good if not better than conventional wound closure techniques (1,2,3).

Accidental injuries in the field may present a similar wound, which may require a soldier to be evacuated from that situation for wound management. There are situations when this may not be feasible or desirable: during a covert surveillance; in bad weather or owing to a peculiar tactical situation. It may be that at such a time effecting wound closure using a tissue glue could retain the combat effectiveness of that individual and prevent the need for evacuation.

Dermabond* (2-Octyl Cyanoacrylate, Ethicon Ltd) was selected as the tissue glue for this study. Twenty four soldiers from 1A&SH (selected on the basis of availability) attended a half-day training package consisting of a presentation covering the situations in which it was and was not appropriate to consider using glue followed by a period of practical instruction. There was a short theory and practical test at the end of the package.

Materials and methods
2-Octyl Cyanoacrylate (Dermabond*) was selected on the basis of ease of use and storage. The particular presentation makes the product simple to use, and there is no requirement for refrigeration. The product is stable up to 30°C (4), and could therefore be carried amongst other simple first aid equipment.

The training package consisted of a presentation covering the times when it would be appropriate to use a tissue glue in the field. These were a covert situation, or when weather or tactical conditions made evacuation difficult. It was emphasised that this procedure should not be carried out when higher medical aid was readily available - for example in barracks or where evacuation was available. The importance of cleaning the wound was stressed, and it was stated that a particularly dirty wound or one which could not satisfactorily be cleaned should not be glued. An absolute requirement for the injured soldier to be formally assessed by a Medical Officer at the next feasible opportunity (to avoid missing any damage to deeper structures) was laid down. A period of practical instruction then followed using wound simulators (Ethicon* S308). Finally a short MCQ and practical assessment completed the package.

The MCQ assessment results are shown below. The wound closures achieved during the test phase were graded satisfactory (good wound edge apposition and absence of glue between wound edges) or not satisfactory.

Results
The results of the MCQ assessment (as percentages) are summarised in Table 1.

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It can be seen that (although the number in each group was small) there was no significant difference between the MCQ assessment results for soldiers trained to Regimental Medical Assistant/Cbt Med Tech (RMA) Team Medic (TM) RFA or ATD5 level. It was noted that the concept which appeared more difficult to understand from the answers to the MCQ assessment was that the adhesive must not be placed between the wound edges. When assessed practically, however, a demonstrated understanding of this principle. All soldiers present were able to glue a wound together satisfactorily using the 2-octyl cyanoacrylate adhesive on the simulators.
Discussion
This work is put forward to show the possibility of using tissue adhesive in the field situation. It would be prudent to pilot the idea further before introducing the product on a wide scale, but the initial response to the idea from the soldiers themselves is enthusiastic.

The most obvious objection in principal to the use of tissue adhesive in this way is the possibility of tetanus prophylaxis being inadequate. If the repair of the wounds in this situation is to be pursued, then the onus will fall on medical centres to ensure that tetanus prophylaxis is in date for all soldiers who may be treated in this way. The principle of not using adhesives on particularly dirty wounds should also minimise this risk.

There are different preparations of wound adhesives available, but the authors are unaware of any other preparation that does not require refrigeration for storage, making field use impractical.

The particular product used is currently available as NSN 6516-99-320-5044

Conclusion
The authors believe that it may be possible for soldiers to use tissue adhesives in certain field situations to maintain combat effectiveness following minor injury. It is shown that soldiers can achieve satisfactory repair of simulated wounds using 2-octyl cyanoacrylate. This idea is put forward for wider adoption particularly within the army, with training in the techniques led by the RAMC.

Acknowledgments
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REFERENCES