Out of hospital needlestick injuries

J P Wyatt, C E Robertson, W G Scobie

Abstract

Retrospective analysis showed that 67 children had presented in Edinburgh with needlestick injuries on 70 occasions over five years. Worryingly, 10 children sustained injuries pretending to be intravenous drug abusers. Despite risks of hepatitis B and HIV infection, protection and follow up were inadequate. Publicity about discarded needles and a treatment plan for use in accident and emergency departments are recommended.

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Needlestick injuries have been studied almost exclusively in the context of adults at work. With large numbers of intravenous drug abusers in the community, however, many carrying the hepatitis B virus and infected with HIV, there is a pool of potentially dangerous needles circulating outside hospital.[1] We investigated the circumstances, frequency, and treatment of children attending hospital after sustaining needlestick injuries.

Methods

We reviewed the case notes of children treated for needlestick injuries in the two accident and emergency departments in Edinburgh which treated children under 13 years between July 1987 and June 1992.

Results

Sixty seven children (51 boys) presented on 70 occasions with needlestick injuries, a rate of 1/1600 new attendances, after 48 needles were found by children. Three children presented twice, after two separate injuries. The case notes of 64 patients (mean age 6·0 years) involved in 45 incidents were retrieved and studied. The mother of one child was a drug abuser.

Table 1 gives the locations where needlestick injuries occurred. Patients involved in these 45 incidents were treated by 32 different doctors. Thirty nine (61%) patients lived in areas where there are known to be large numbers of intravenous drug abusers. Ten (16%) children sustained needlestick injuries while pretending to be intravenous drug abusers.

Table 2 shows how patients with varying evidence of skin penetration were managed. Expert advice was obtained for 37 patients (55%); 36 (97%) of these subsequently received protection against hepatitis B. No patient was given zidovudine and none was known to have contracted hepatitis or become infected with HIV, though only three were followed up.

Table 1 Location of the 45 incidents studied

Location	*No of incidents*
Public park	5
Street	4
Own stairwell of flats	4
Own garden	3
Beach	2
Swimming baths	2
School playground	1
On public bus	1
On bowling green	1
Railway embankment	1
Dustbin at home	1
Garage roof	1
Not recorded or unknown	19

Table 2 Treatment of 67 possible needlestick injuries with various likelihoods of skin penetration

Evidence of skin penetration	*Hepatitis B immunoglobulin given*	*Hepatitis B vaccine given*	*Tetanus considered*	*Serum saved*
Puncture wound	40/45	34/45	16/45	32/45
History of penetration	7/9	6/9	3/9	7/9
Penetration unlikely	9/13	9/13	3/13	6/13
All children	56/67	49/67	22/67	45/67

Discussion

Needlestick injuries to children outside hospital were first identified in three case reports from Liverpool in 1987.[2] No reports followed so the scale of the problem remains obscure. The figure of 67 children in five years attending accident and emergency departments in Edinburgh with needlestick injuries probably underestimates the problem, as some children may not have told their parents of the injury and some parents may not have sought hospital treatment.

It is worrying that many injuries occurred in places where children might be considered 'safe'. Also worrying was the fact that 10 children presented after copying drug abusers. It may be speculated that such role play might precede actual drug abuse later in life.

The dangers associated with needlestick injuries in these children remain speculative. There appears to be a significant risk of the transmission of hepatitis B and a lesser, but definite, risk of transmission of HIV infection.[3,4] A history of skin penetration may be unreliable in children. All those who may have sustained a needlestick injury should be offered protection against hepatitis B, best achieved by the early administration of immunoglobulin and hepatitis B vaccine.[5] It is worrying that 11 (16%) children did not receive any protection against hepatitis B and only 49 (73%) received optimal protection. The likelihood of the child having sustained a needlestick injury did not exert a major influence as to whether or not they were given hepatitis B protection; five patients did not receive it despite visible

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puncture wounds. This inadequate protection against hepatitis B may reflect the limited experience of individual doctors: when expert advice was obtained, protection against hepatitis B was given in 36 of 37 (97%) cases. Similarly, the possibility of tetanus appears to have been neglected in many children. Although no child is known to have subsequently developed any sequelae, follow up was inadequate. The possibility of testing material within a needle brought with a child to hospital and saving the child's serum (to help identify the time of any seroconversion) should be considered.

Attempts to prevent HIV seroconversion remain of unproved value.[6] Attention should be directed towards the prevention of needlestick injuries. This might be achieved by publicising the dangers of needles and by urging drug abusers to dispose of needles in a more responsible manner. Perhaps children living in 'high risk' areas should be offered routine prophylaxis against hepatitis B at a young age.

We recommend that a plan should be available in accident and emergency departments for managing out of hospital needlestick injuries. This plan would include prophylaxis against hepatitis B and tetanus and allow referral to an appropriate expert for counselling and follow up.

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Surface area estimation: pocket calculator *v* nomogram

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Abstract

Three sheets of 10 surface area determinations were completed by 10 subjects using a nomogram and a formula. The formula was faster to calculate, 4·27 *v* 7·6 minutes for each sheet, and resulted in fewer serious errors (three *v* 30 errors).

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Surface area has been used to determine the dose of chemotherapy drugs for the treatment of cancer since their introduction for human subjects and, more recently, to predict biochemical adrenal suppression in children receiving treatment with inhaled corticosteroids.[1] Clinically, surface area is estimated from measured height and weight, either with a surface area calculator or a nomogram.[2] Mosteller's simplified pocket calculator formula (surface area (m^2) equals the square root of the expression height (cm) multiplied by weight (kg) divided by 3600) is a third alternative.[3]

The most commonly used nomogram[2] was produced by Professor C D West of the University of Cincinnati. The formula on which it is based was derived from the data of Boyd.[4] Neither the subset of data used by West nor the formula he derived has been published. The nomogram itself has been validated by years of safe clinical use. We compared the Boyd-West nomogram with the Mosteller equation.

Methods

Ten volunteer staff from the department of paediatrics participated in the study. Thirty paired height and weight measurements from children with cancer (surface area 0·4–1·7 m^2) were divided into sets of 10 and distributed to the volunteers at intervals not shorter than one week. They estimated the surface area for the nomogram, and nine months later on a pocket calculator.

The volunteers were instructed to record their results to an accuracy that they would use if the surface area was to be used to determine the dose of chemotherapy drugs to be given to the child.

It was our intention to compare 'correct use' of the nomogram with the equation. Nomogram surface area determinations which had methodological errors were repeated by the volunteer.

The sample of heights and weights used was then enlarged: 199 consecutive surface areas and the respective heights and weights were selected from the oncology ward log book.

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