Mass Needle Stick Injury in Children from the Western Cape

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Summary

Illegal dumping of contaminated medical waste occurs commonly in South Africa. There is little information on the management and outcome of the children exposed to and injured by medical waste. On 15 September 1999, 54 children where involved in a mass exposure incident. 44 presented the same evening and 10 following day. Used needles and syringes were discarded on their soccer field. Children gave one another injections and played darts with the discarded needles. Parents were counselled and blood was drawn for HIV and Hepatitis B virus (HBV) serology. All were given HBV vaccination (HBVV). Stat doses of zidovudine (ZDV) and lamivudine (LMV) were given to all with visible wounds or history of percutaneous injury. Younger children were given prophylaxis as we considered their histories unreliable. Further visits were conducted at the community clinic for patient convenience. Children were reviewed at weeks 1 and 3 for drug adherence and side effects. At week 4, the second HBVV was given. At 3 months and 6 months HIV and HBV serology were repeated. 18/44 (40 per cent) had entry wounds. 44/54 (81 per cent) were given antiretroviral treatment (ART). Initial screening for HIV was negative in all, 6 had antibodies to HBV surface antigen, and 2 were HBV surface antigen positive. At week 1 all patients on ART were seen but at week 3 only 30 (55 per cent) attended. 41 (75 per cent) attended at 4 weeks, 8 non-attendees being located by primary healthcare workers. At 3 months, none of the 35 (64 per cent) children had seroconverted for either virus. 44 (81 per cent) attended at 6 months and all serology was negative. All were also Hepatitis C negative. The exposure incident sensitized the community to HIV. Follow up of patients after mass exposure is difficult and time-consuming. Adherence to ART was poor and should be carefully monitored. ZDV was probably adequate for this incident. In a non-mobile community a 3 month visit unnecessary.

Introduction

Children may be exposed to blood born viruses through discarded syringes and needles. In resource-poor countries, this can occur through illegal dumping and in richer countries through discarded needles and syringes from intravenous drug use [1, 2]. Both usually occur in areas where children might be exposed through play. In a review of South African newspaper articles from January 2000, 25 incidents were reported [3].

Acknowledgements

We acknowledge the dedicated assistance of Mr Dan van Houten, the community representative who facilitated the transport of families and were saddened to learn of his untimely death. Sister Hendricks and staff at the Leonsdale Community provided invaluable support with patient follow-up and management. We also thank the staff of the Tygerberg Children’s Hospital for their support.

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The risk associated with exposure to medical waste is not known but can be extrapolated from the experience of occupational exposure in health care workers (HCW). For example, the risk for hepatitis B virus (HBV) after percutaneous exposure varies between 6 per cent and 30 per cent and for HIV it is 0.3 per cent in the absence of intervention [4–6]. We managed 54 children after a mass exposure incident in a nearby community and now report our experience. There are few data on long-term follow-up of such incidents.

History

On the evening of 15 September 1999, 44 children between 3 and 14 years of age were brought to the emergency room of Tygerberg Children’s Hospital (TCH), a tertiary care institution in the Western Cape Province, after exposure to potentially contaminated medical waste. Used needles and syringes had been discarded on their soccer field in the early hours of the morning. Children had played with the discarded equipment before and after school. They had used discarded needles to give one another injections and also threw needles at one another,
both activities resulting in percutaneous injury. The following day an additional 10 children were brought for evaluation. The incident occurred in Leonsdale, a poor community 10 km from TCH.

Management

All children were examined and, after obtaining informed consent, baseline investigations were drawn for HIV and HBV serology. Pre-test counselling was by means of explanatory lecture to all the parents followed by questions and answers. Parents and caregivers were reassured that the risk for transmission of HIV and HBV was considered low.

The children were immediately immunised with Hepatitis B virus vaccine (HBVV) (Heppacine, Biovac SA). As HBVV had only been included in the immunisation schedule in South Africa since July 1995, the majority of the children were still susceptible. Tetanus toxoid was given to all children older than 13 years of age. Stat doses of zidovudine (ZDV) and lamivudine (LMV) were administered under medical supervision.

No prophylaxis was given to a small group of adolescents whose history of non-contact with medical waste was considered reliable, provided that no wounds were visible. They had reported the incident to their parents and had intervened to stop further exposure among children.

Because of insufficient medication in the pharmacy, further medication was only dispensed the next morning. Family members were instructed to return the next day when a one-week supply was dispensed. Arrangements were made to monitor compliance and side effects of antiretroviral (ARV) drugs and also evaluate outcome. A community political representative facilitated communication with the families and accompanied the families from the first visit.

Follow up

Children were seen after the first and third week. ARV adherence was evaluated by inquiring about leftover medication. As exact amounts had been given, anyone with leftover medication was considered non-compliant. The parents and children were asked about ARV intolerance. In an attempt to minimize inconvenience and reduce transport costs for the families, further follow up visits were conducted at the local community clinic. HBVV was repeated at week 4 and at 6 months. At 3 and 6 months HIV (HIV 1/2gO) and HBV serology with Abbott AXSYM system (Wiesbaden, Germany) were repeated. Hepatitis C (Hep C) serology was also done at 3 and 6 months with the Abbott AXSYM system (Wiesbaden, Germany).

Results

Demographic information is shown in Table 1. The children were between 3 and 14 years of age (mean 9.6 years). At presentation 18/44 (40 percent) had entrance wounds, two more had histories of entrance wounds and 23 had played with the medical waste. 44/54 (81 percent) were given ART.

The extent and duration of the follow up is shown in Table 2. At week one, 52 (96 percent) patients were seen including all those on ART. By week 3, follow up had declined to 35 (64 percent) of whom 31 were still taking medication. From week 4, visits took

<table>
<thead>
<tr>
<th>Visit</th>
<th>Location</th>
<th>Patient n (%)</th>
<th>Number given Antiretrovirals (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>TCH</td>
<td>54 (100)</td>
<td>44 (81)</td>
</tr>
<tr>
<td>Week 1</td>
<td>TCH</td>
<td>52 (96)</td>
<td>44 (84)</td>
</tr>
<tr>
<td>Week 3</td>
<td>TCH</td>
<td>35 (64)</td>
<td>#31 (88)</td>
</tr>
<tr>
<td>Week 4</td>
<td>Community clinic</td>
<td>*49 (90)</td>
<td>36 (76)</td>
</tr>
<tr>
<td>Month 3</td>
<td>Community clinic</td>
<td>35 (64)</td>
<td></td>
</tr>
<tr>
<td>Month 6</td>
<td>Community clinic</td>
<td>44 (81)</td>
<td></td>
</tr>
</tbody>
</table>

*Include 8 non-attendees that were traced.

*7 patients experienced nausea at 3 weeks.

*Reminder letters sent prior to clinic date.

TCH, Tygerberg Children’s Hospital.
place in the community health centre after a request from the families. Attendance improved slightly to 41 (75 per cent). Primary health care workers later located 8 non-attendees who were then given a second dose of HBVV. ARV adherence declined from 64 per cent at week 3 to 52 per cent by week 4. Seven patients (15.9 per cent) on ARV experienced nausea at 3 weeks. Only 35 (65 per cent) children attended at 3 months because of school holidays. Prior to the 6-month visit, letters were sent to the families to remind them of the follow-up appointment. At this time, forty-four (81 per cent) children attended and 39 children received HBVV.

Laboratory results are shown in Table 3. Baseline HIV serology was negative in all children. Two HBV surface antigen positive children were referred with their families to the community day clinics. Six patients were HBV surface antibody positive. By 3 months, none of the 35 (65 per cent) children had seroconverted for either virus. At 6 months all serological tests, including Hepatitis C (Hep C) were negative.

**Table 3**

<table>
<thead>
<tr>
<th>Visit</th>
<th>n</th>
<th>HIV Ab –ve</th>
<th>HIV Ab +ve</th>
<th>HBV Surface Ag +ve</th>
<th>HBV Core Ab +ve</th>
<th>HBV e Ag –ve</th>
<th>Hep C Ab –ve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>54</td>
<td>54 (100%)</td>
<td>0 (0%)</td>
<td>2 (4%)</td>
<td>6 (11%)</td>
<td>46 (85%)</td>
<td>Not done</td>
</tr>
<tr>
<td>3 months</td>
<td>35</td>
<td>35 (100%)</td>
<td>0 (0%)</td>
<td>1 (3%)</td>
<td>3 (9%)</td>
<td>31 (88%)</td>
<td>35 (100%)</td>
</tr>
<tr>
<td>6 months</td>
<td>44</td>
<td>44 (100%)</td>
<td>0 (0%)</td>
<td>2 (5%)</td>
<td>4 (9%)</td>
<td>38 (86%)</td>
<td>44 (100%)</td>
</tr>
</tbody>
</table>

Ab, antibody; Ag, antigen.

The transmission risk increases with deep hollow-bore needle stick injury and a direct inoculation of blood but even trivial exposure may be dangerous. HBV is still infective one week after being dried and exposed to the environment [8]. In a review of unsafe injections in the developing world, the probability of transmission was 20–40 per cent for HBV and 0.3 for HIV [9].

Merchant and Keshavarz reviewed of non-occupational HIV exposure and post exposure prophylaxis (PEP) in children. They support the use of ART as PEP. The largest case series – comprised only seven cases. Compliance with PEP subsequent follow-up was approximately 50 per cent [10]. More recently, Makwana and Riordan reported on a prospective evaluation of 53 children followed for community needlestick injuries in the United Kingdom, a country with a low prevalence of HIV. The loss to follow-up at 6 months approached 50 percent. None were positive for HIV, or hepatitis B or C [11].

There are no formal guidelines for HIV PEP in adults and children [6]. Nelson’s Pocketbook of Paediatric Antimicrobial therapy recommends ZDV alone for injury from discarded medical equipment [12]. The most common practice, however, is to offer two drugs, preferably within an hour of exposure [13]. Lamivudine may have the added benefit of preventing HBV infection [14, 15].

A suggested management algorithm after exposure to medical waste is shown in Fig. 1. Hep C studies could be included, depending on prevalence and resources. The follow-up of patients after mass exposure is both time consuming and labour-intensive. In a non-mobile community a 3 month visit is probably unnecessary as there are no interventions at this stage. The community-based follow-up is better than hospital follow-up as patients are easily traced.

Although PEP with ZDV alone was probably adequate for the present incident there was some concern due to the high HIV seroprevalence of 7.9 per cent in woman attending antenatal clinics in the area [16]. At that time, antenatal screening for HIV had not yet been instituted. The risk of horizontal transmission between children could have been appreciable.
**Fig. 1.** Suggested Management Algorithm for children exposed to medical waste.

- **HBV** – Hepatitis B virus
- **HBVV** – Hepatitis B virus vaccine
- **Art** – Antiretroviral therapy
- **PEP** – Post exposure prophylaxis

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**EXPOSURE**

Baseline (In hospital)

**History, Examination, Counseling, Consent**

Serology HIV 1/2 and HBV

HBVV, Tetanus

**ART PEP**

**Week 1 (Community)**

Monitoring adherence & side effects

Issue medication

**Week 2**

Monitoring adherence & side effects

Issue medication

**Week 3**

Monitoring adherence & side effects

Issue medication

**Week 4**

**HBVV**

6 Months

**HBVV Serology HIV 1/2 & HBV**
Conclusion

The exposure incident had the benefit of sensitising the community to HIV and an unintended benefit was the establishment of an HIV awareness event (a march through the town where knowledge about HIV was disseminated). The site of illegal dumping was converted to a playground for children, funded by the Tygerberg Municipality. Exposure to medical waste due to illegal dumping is continuing threat. Legislation needs to be effectively applied. More data on follow-up exposed subjects should be collected.

References