

Strategies for safe injections

A. Battersby,¹ R. Feilden,¹ P. Stöckel,² A. Da Silva,² C. Nelson,³ & A. Bass⁴

In 1998, faced with growing international concern, WHO set out an approach for achieving injection safety that encompassed all elements from patients' expectations and doctors' prescribing habits to waste disposal. This article follows that lead and describes the implications of the approach for two injection technologies: sterilizable and disposable. It argues that focusing on any single technology diverts attention from the more fundamental need for health services to develop their own comprehensive strategies for safe injections. National health authorities will only be able to ensure that injections are administered safely if they take an approach that encompasses the whole system, and choose injection technologies that fit their circumstances.

Keywords: disposable equipment; injections, instrumentation; sterilization; syringes, utilization.

Voir page 998 le résumé en français. En la página 999 figura un resumen en español.

Background

National health authorities, international agencies that support health services, researchers and health providers have been discussing problems with unsafe injections for many years. The purpose of this article is not to revisit that experience, but to propose what should be included in any strategy for addressing the issue of injection safety.

In March 1998 WHO drafted a broad strategy to promote the safety of all injections (1). The report acknowledged unsafe injection practices^a as a major health problem leading to the transmission of bloodborne pathogens. It stated that up to 30% of injections may be unsterile and that WHO would develop an integrated strategy to improve quality of injection practices worldwide. The report continued:

"The overall aim of this strategy is: To develop and implement policies and programmes in collaboration with countries and other partners, which will raise awareness to the gravity of unsafe injection practices, to ensure safe and rational use of injections, and reduce death and diseases spread by unsafe injection practices."

In April 1999 the Technet Internet Discussion Forum posted a draft statement that outlined a policy for immunization advocating the use of auto-

disable (AD) syringes only (2). Objections were raised by several participants who pointed out that an approach which depends on one technology does not recognize that different parts of a health service have different requirements for parenteral devices and that one solution cannot fit all the circumstances in all countries. WHO and the United Nations Children's Fund (UNICEF) revised the statement following a meeting on 7 July 1999 (3). The revised statement acknowledges the place of both sterilizable and AD syringes, but still lays emphasis on a top-down approach to encourage countries to favour specific technologies. At the same time, following an initiative begun by the United States Agency for International Development (USAID) in late 1998 (4), plans have been prepared to set up a Safe Injection Global Network (SIGN). The objective of this network is to develop a suite of tested intervention strategies by 2002 which will be used by countries to prevent the injection-associated transmission of bloodborne pathogens (5).

An inclusive policy statement

The WHO/UNICEF statement setting out a policy on safety of injections for immunization (3) is primarily focused on technology. It is not consistent with the spirit of the broad WHO strategy of March 1998 (1). The present article sets out an inclusive policy statement, recognizing that no single solution can fit all circumstances and that countries have different levels of resources. This policy statement was originally posted to Technet in May 1999 (6) and states:

"In all countries, national health authorities should choose systems and allocate budget to ensure safe injections that encompass all components: training of staff, establishment of monitoring, acquisition of equipment and supplies, their distribution and use, disposal and destruction of waste, and final containment."

¹ Feilden Battersby Health Systems Analysts, Riverside Cottage, Tellisford, Bath BA3 6RL, England. Correspondence should be addressed to Mr Battersby at this address.

² Association pour l'Aide à la Médecine Préventive, Marnes la Coquette, France.

³ Program for Appropriate Technology in Health (PATH), Seattle, WA, USA.

⁴ Australian Centre for International and Tropical Health and Nutrition (ACITHN), Faculty of Health Sciences, University of Queensland, Brisbane, Australia.

^a A safe injection does no harm to the recipient, does not expose the health worker to avoidable risk and poses no threat to third parties. WHO Technet Conference, 31 May–4 June 1994.

These systems must fit the conceptions of the society in which they will be used, must tolerate the level of operations management available, and must be affordable. The omission of any single component will cause a chosen injection strategy to become unsafe."

Over the last 10 years there has been a piecemeal approach to injection safety with each element of a health service choosing to do what it perceives suits its own immediate needs. Experience shows that this *ad hoc* approach fails to reduce the transmission of bloodborne pathogens from dirty injections. Therefore we have learned that it is a prerequisite that a strategy for safe injections must address all elements of a health service and be supported by all parties. The steps that must be taken to establish safe systems for administering injections are shown in Table 1.

Examples

Behaviour. For any technology or procedure, knowledge and skills need to be updated to make sure that behaviour is consistent with current best practice. This applies not only to clinical staff but also to ancillary workers inside and outside the health service.

- Basic training may not have covered the day-to-day handling of the type of injection equipment used in health centres. For example, in a hospital where nurses are trained, sterilizing and waste disposal are usually carried out by support services.
- Even a well-established technology such as sterilization has new elements. For example, the TST (time–steam–temperature) indicators require that staff be trained to use them correctly.
- When sterilizable syringes are replaced by disposables there is a new component — the cap or sheath — and staff must learn what to do with it, to avoid needle-stick injuries.
- Staff must also be trained how to manage increased throughput of stock and volumes of waste that are up to 200 times greater for disposable injection equipment.
- The introduction of AD syringes also requires training in drawing-up technique (7). The effects on injection practices of temporarily switching between technologies (e.g. during mass campaigns) have not been assessed.

Field studies have observed the same health worker using different standards of safety depending on whether the service is curative or preventive (8); any strategy for improving injection safety must be based on a thorough understanding of all elements contributing to such behaviour.

Management. Each technological development has implications for management systems, including procurement, storage, distribution, and operational strategies for service delivery. Systems for monitoring and auditing all these processes are

Table 1. Steps in the strategies for using disposable or sterilizable syringes

Strategy for disposable syringes	Strategy for sterilizable syringes
1. Inform and educate health workers, managers and decision-makers to develop a culture of safe injections.	1. Inform and educate health workers, managers and decision-makers to develop a culture of safe injections
2. Develop and implement training which emphasizes the importance of maintaining all aspects of the system, from supply to final containment. Basic curricula, in-service training and supervision must provide skills and convince staff about duty of care to the client/patient and third parties, and safe practices for health workers.	2. Develop and implement training which emphasizes the importance of maintaining all aspects of the system, from supply to final containment. Basic curricula, in-service training and supervision must provide skills and convince staff about duty of care to the client/patient and third parties, and safe practices for health workers.
3. In view of the enormous volume of hazardous waste, allocate funds for disposal systems, including the provision of approved safety boxes, suitable transport, environmentally acceptable destruction equipment, and final containment. At present the least detrimental option for destruction is incineration above 1000 °C.	3. Set up systems for procuring and distributing supplies of equipment and fuel, and for monitoring that sterilizable equipment is used and disposed of correctly.
4. Allocate funds for training and for purchasing the safest syringes that can be afforded (conventional disposable, AD or safety depending on circumstances), remembering that the whole system (supply, disposal, destruction, and final containment) must be funded and used.	4. Allocate funds for training, for the purchase and supply of sterilizable syringes and needles, sterilizing equipment, drums/racks, sterilization indicators, spare parts, and safety boxes, and for the disposal, destruction, and final containment of waste.
5. Establish recording systems for monitoring disposal/destruction systems, thus minimizing the risk of theft of both new and used syringes.	5. Ensure that records are kept of the injections administered, sterilization cycles carried out, and waste destroyed.
6. Develop minimum acceptable standards for use and handling, storage, distribution, disposal, destruction, and final containment.	6. Develop minimum acceptable standards for use and handling, storage, distribution, disposal, destruction, and final containment.

required in order to demonstrate that these problems are being addressed satisfactorily.

- The use of sterilizer drums alters the configuration of equipment (e.g. the size and number of autoclaves and stoves); the drum allows sterilization to be separated in time and location from the point of service delivery, enabling more flexible operational strategies to be developed (9).
- If disposable syringes replace sterilizables, the huge increase in volume of supplies must be taken into account either by increasing the size of stores or by shortening procurement, supply and delivery intervals.
- At present the greatest unsolved problems accompanying disposable technologies are safe disposal, environmentally acceptable destruction, and final containment of the residual waste.

Finance. The financial implications of different technologies vary.

- The strategy for sterilizable injection equipment requires a relatively large initial outlay for equipment, continuing expenditure on spares and replacements, and fuel, which in many health systems must come from local budgets that may be vulnerable to underfunding. The cost per injection depends on the useful life of the syringes and needles, which is largely determined by the level of mineral salts in the water used in the sterilizer. Excluding the cost of storage, fuel, distribution, destruction and final containment, the indicative cost (10) for an average mix of 1000 parenteral procedures using sterilizables is between US\$ 5.40 and US\$ 15.16, depending on use life.
- Strategies for disposable injection equipment require continuous expenditure on recurrent supplies, their distribution, destruction and final containment. The last two elements of this strategy require expenditure on processing medical waste and on installing and running incinerators; the health service may decide to do these tasks itself or to contract out to accredited clinical waste disposal companies. Funding for these elements of disposable technologies has been ignored in many countries. Excluding the cost of storage, distribution, fuel, destruction and final containment, the indicative cost (10) for an average mix of 1000 parenteral procedures using conventional disposables is US\$ 75.61. If ADs are substituted for injections of ≤ 2 ml, the cost is US\$ 99.31 per 1000 parenteral procedures. Where the national authorities have made adequate provision for disposal and destruction, they have found that the cost is approximately equal to the cost of providing the disposable injection equipment itself (11).

Funding alone cannot deliver safety. Different technologies require different levels of effort for each part of the safe injection strategy; injection technology is only one element of safe injections (12). In all countries, both finances and human resources are finite; therefore each national authority has to consider its own circumstances and decide where it can dedicate the effort needed to ensure safe injections. The chosen strategy must fit the resources available in terms of the country's reserves of human energy.

Conclusion

Approximately 12 000 million (12 billion) injections are given worldwide each year (13). In order to improve the safety of injections there must be a major drive by both national authorities and international partners to reduce the total number of injections, assure the quality of products injected, and establish sustainable strategies for safe injections. The approach for developing these strategies must be subtle enough to accommodate differences of wealth, culture and infrastructure, while maximizing the probability of success.

This proposal for improving injection safety aims to accommodate the different circumstances of health systems throughout the world. It emphasizes the fact that with correct behaviour throughout the system, adequate management, and sufficient finance any injection technology can be safe. When national authorities seek to identify the strategy most suited to their needs, they must take account of all three elements: behaviour, management and finance. Their chosen technologies must fit their circumstances and must be sustainable in terms of both finance and effort. ■

Résumé

Stratégies d'amélioration de la sécurité des injections

Fait de plus en plus préoccupant, un nombre non négligeable des 12 milliards d'injections pratiquées chaque année ne répondent pas aux normes de sécurité. En 1998, l'OMS a préparé un projet visant à améliorer la sécurité des injections. Ce projet portait sur tous les aspects du processus, depuis les attentes du patient et le comportement du prescripteur jusqu'à la gestion de la totalité du processus, y compris l'élimination et la destruction des déchets, en passant par les décisions en matière d'achat et le financement.

La stérilité du matériel d'injection est un élément indispensable de la sécurité. Une tentative d'amélioration de la sécurité des injections vaccinales menée en Afrique de l'Ouest a conduit à élaborer un avant-projet, qui a été diffusé sur le forum de discussion Technet sur Internet. La proposition portait essentiellement sur un aspect de la technologie d'injection (seringues autobloquantes) et demandait à tous les pays d'utiliser ce type de matériel. Les réponses des correspondants du réseau Technet dénotaient une réticence vis-à-vis de

cette approche étroite et trop directive, en contradiction avec le concept d'approche systémique préconisé par l'OMS en 1998. Plusieurs alternatives ont été soumises au forum Technet en avril et mai 1999, qui ont conduit à un examen des répercussions du choix d'une technologie particulière en fonction de six éléments d'une stratégie visant à réaliser la sécurité des injections.

La présente proposition cherche à appliquer le concept d'approche systémique à l'identification et à l'élaboration de stratégies d'amélioration de la sécurité des injections. Il est souligné qu'aucune technologie d'injection ne peut être sûre tant que des conditions telles qu'un comportement correct, une gestion appropriée et un financement suffisant à tous les niveaux du système de santé — des décideurs aux nettoyeurs, des responsables des achats aux patients — ne sont pas remplies. Toute stratégie destinée à améliorer la sécurité des injections doit donc porter sur la totalité des éléments nécessaires pour assurer la sécurité de la technologie d'injection choisie. Les deux principales options —

matériel stérilisable et matériel jetable — différent quant au degré et à l'objet des efforts à consentir, aux implications financières et à l'infrastructure sociale et matérielle nécessaire pour les appliquer correctement. De nombreux systèmes de santé n'ont pas pris leurs responsabilités en matière de destruction des déchets générés par la technologie d'injection. Tous les établissements de soins doivent être capables de stériliser le matériel, mais certains systèmes de santé

ne sont pas en mesure d'assurer que les services de soins de santé primaires disposent de systèmes de stérilisation opérationnels. Les autorités nationales sont confrontées à des situations très diverses en ce qui concerne les ressources financières, le potentiel d'économies ou le niveau d'effort consenti. Chaque autorité nationale doit choisir des stratégies compatibles avec les conditions qui prévalent dans le pays et qui pourront donc être maintenues à long terme.

Resumen

Estrategias de fomento de la seguridad de las inyecciones

Crece la preocupación por el hecho de que una parte considerable de los 12 000 millones de inyecciones administradas cada año no son seguras. En 1998 la OMS elaboró una estrategia de mejora de la seguridad de las inyecciones que abarcaba todos los posibles aspectos, desde las expectativas del usuario y el comportamiento del prescriptor, pasando por las decisiones de compra, hasta la financiación y la gestión de la totalidad del proceso, inclusive la eliminación y el aislamiento definitivo del material desechado.

Una condición necesaria para garantizar la seguridad es la esterilidad del material de inyección. Una iniciativa de mejora de la seguridad de las inyecciones de inmunización en África occidental condujo a un proyecto de propuesta que se difundió en el Foro Technet de Internet. La propuesta se centraba en un aspecto de las técnicas de inyección (jeringas autodestruibles) y requería que todos los países adoptaran ese tipo de material. La respuesta de los participantes en Technet reveló cierto descontento y resistencia ante ese enfoque prescriptivo y estrecho, que no se compadecía con la perspectiva general propugnada por la OMS en 1998. Las diversas propuestas alternativas presentadas en el Foro Technet durante abril y mayo de 1999 han llevado a analizar las repercusiones de la elección de una determinada tecnología con arreglo a seis elementos de una estrategia de fomento de la seguridad de las inyecciones.

La actual propuesta aspira a aplicar las nociones de una estrategia de ámbito general a la identificación y desarrollo de estrategias de mejora de la seguridad de las inyecciones. Se subraya en ella que ninguna técnica de inyección será segura a menos que se garantice una forma de proceder correcta, una gestión adecuada y fondos suficientes a todos los niveles del sistema de salud, desde los responsables de la toma de decisiones hasta los encargados de la limpieza, desde los jefes de compras hasta los pacientes. Por consiguiente, cualquier estrategia de fomento de la seguridad de las inyecciones debe incluir todos los elementos necesarios para utilizar sin riesgos la técnica de inyección elegida. Las dos opciones principales — jeringas esterilizables y jeringas desechables — difieren en lo que respecta al nivel y las prioridades del esfuerzo requerido, las repercusiones financieras y la infraestructura social y física necesaria para utilizarlas correctamente. Muchos sistemas de salud han descuidado su deber de destruir los desechos que resultan de las inyecciones. Todos los centros de salud deben poder esterilizar el material, pero algunos sistemas de salud no han conseguido asegurar el mantenimiento de sistemas de esterilización para los servicios de atención primaria. Las autoridades nacionales afrontan circunstancias muy diversas en lo que respecta a la capacidad de financiación y de ahorro o el nivel de esfuerzo, de ahí que cada una deba seleccionar estrategias que sean compatibles con sus propias circunstancias y, por ende, sostenibles.

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