Public Health Practice

Unfinished business: adult immunization against tetanus
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Where effective child immunization schemes have been established virtually all cases of tetanus occur in persons aged over 50 years. Adult immunization programmes should be introduced in order to protect this age group against the disease.

In the United Kingdom, childhood immunization with attenuated tetanus toxoid began in 1961, and protective antitoxin levels have been found in 87–100% of patients 15–25 years after completion of primary immunization. A tetanus toxoid booster given to teenagers who have received primary immunization provides protection for decades. However, tetanus continues to affect adults in the United Kingdom and other developed countries. All cases of tetanus reported in the United Kingdom now occur in people aged over 50 years. In the USA, of 114 cases reported in 1989 and 1990, 58% were in persons aged 60 years or more.

Immunity declines after the age of about 50 years (1, 2). Until a definite decrease in the incidence of tetanus is established it is desirable to have an immunization programme in order to protect older people. Accident and emergency departments in the United Kingdom administer tetanus toxoid and human tetanus globulin to injured persons but most tetanus cases are associated with minor wounds for which medical attention may not be sought. Furthermore, the status of immunity to tetanus and the decision to reinforce it is often determined by the individual’s history of immunization, about which considerable uncertainty may exist.

Protective immunity develops in the elderly after suitable vaccination with tetanus toxoid; there are no significant adverse side-effects. A rapid and vigorous response to revaccination with tetanus toxoid occurs irrespective of the number of years that have elapsed since the original immunization. The immunization of armed service personnel in the United Kingdom produces antibody titres above 5.0 i.u./ml; this rises to above 10.0 i.u./ml after pre-combat boosting, without adverse effects.

Reactions following the administration of tetanus toxoid have been reported in individuals who have previously received multiple doses and show high antibody levels at the time of injection. These reactions are attributable to the formation of complexes between...
antibody and the injected toxoid, which attract complement and leukocytes, thereby producing localized vascular damage followed by swelling, pain and malaise. No confirmation has been obtained of the suggestion that a recent history of immunization against tetanus or hepatitis is associated with disorders resembling rheumatoid arthritis. There have been reports of the excessive use of tetanus toxoid leading to polyneuropathy. However, the toxoid preparations currently available are not known to have caused adverse reactions.

As the overall incidence of tetanus is low in developed countries it can be inferred that most people have received some form of immunization against the disease. Difficulties arise in recognizing vulnerable groups in the populations concerned. It is possible to assess the degree of immunity in population groups by means of bench haemagglutination and enzyme-linked immunosorbent assays. This helps to avoid overtreatment but it may not be cost-effective to have the capability to perform the tests in all emergency rooms and general practitioners’ surgeries.

Conflict arises between the aims of:

- maintaining immunity in the entire population at all times;
- targeting only the people who are at greatest risk.

Furthermore, there is no agreement as to the most cost-effective method of ensuring immunity among elderly people. The following suggestions have been made.

- A booster should be given to adults every 10 years.
- A single booster should be given at the age of 65 years.
- No intervention should take place after the age of 6 years except for wound prophylaxis.

In the USA the recommendation for routine booster doses in adults has been poorly followed. The cost of programmes aiming to achieve this goal should be set against the expense incurred in managing tetanus patients.

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In the United Kingdom the cost of treating a patient with tetanus in an intensive care unit is approximately £ 30 000 (US$ 46 000), the same as 100 000 doses of toxoid. The cost of care for such patients over the past decade was about £ 4 million (US$ 6.1 million), whereas the cost of reinforcing doses giving protection lasting a decade to people aged over 50 years would have been approximately £ 4.5 million (US$ 6.9 million) and there would have been an estimated additional cost some 30 times higher for vaccine delivery. However, where delivery systems are not too expensive the cost of giving reinforcing doses to vulnerable groups is likely to be only marginally greater than that of patient care.

Approximately 6 million adults were immunized with tetanus toxoid in Czechoslovakia between 1973 and 1975, and as from 1976 routine tetanus toxoid immunization of all adults was performed. The annual incidence of tetanus fell from 60–90 cases before the immunization programme began to 1–3 in 1990–94 in the Czech Republic, in a total population of about 10 million. Reimmunization at intervals of 10 years is recorded on every citizen’s identity card.

In the Democratic People’s Republic of Korea, immunization against tetanus begins at the age of 3 years and is repeated a month later; a third dose is given after another 4 months and then at intervals of...
5 years until the age of 55 years. Since 1989 there have been no reports of tetanus in the country, whereas in 1987 there were 123 cases. In Bangladesh, Haiti, Mozambique, Sri Lanka and other developing countries the incidence of neonatal tetanus has been reduced by

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immunizing women of childbearing age, in particular pregnant women. As the coverage of these women and of children widens, it is to be expected that neonatal and childhood tetanus will become rare and a pattern similar to that found in the developed world will emerge.

It is worth noting that malaria and HIV infection have been reported to diminish the immune response to tetanus toxoid (3, 4). The strategy of no intervention in persons aged over 6 years except for wound prophylaxis is unsatisfactory since over two-thirds of reported cases of tetanus are associated with wounds not considered serious enough to require medical attention. Furthermore, in Sri Lanka the disease has been known to occur after middle-ear infections and skin infections.

A major problem in achieving effective immunization is the need for repeated contact between the health care system and the vaccine recipient. Of course, immunization can be provided in an opportunistic manner when patients visit general practitioners or hospitals for other reasons. This could lead to reduced expenditure by both the patients and the health care delivery system. Until single-dose tetanus toxoid preparations become available for routine use, opportunistic immunization may prove effective in providing immunity in vulnerable groups. Developing countries in particular should have systems for recording immunizations. If the policy decided on involves giving a single booster dose, the age at which it is administered should be linked to life expectancy in the country concerned.

In the light of what has been observed in the developed world, where tetanus continues to be encountered in people aged over 50 years, developing countries should now incorporate schemes for the protection of adults in their immunization programmes.

**References**


