are used for venepuncture. At blood-sampling for the sedimentation test we must also calculate with the presence of this risk.

The risk of infection can be eliminated in two ways: (1) by the use of sterile needles alone without syringes at venepuncture; (2) by the provision of a sufficient number of syringes to enable a fresh sterilized instrument to be used for every patient.

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SYRINGE-TRANSMITTED JAUNDICE

AN INQUIRY AND A PLEA

BY

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At least two articles have been published demonstrating the inadequacy of sterilization technique coincident with a high incidence of jaundice in V.D. clinics. Three convincing series of observations (notably that of Laird, 1946) show that adequate sterilization and supervision of intravenous technique result in a fall in the percentage of syphilitics developing hepatitis while under treatment.

The present investigations were conducted in a V.D. clinic where sterilization and intravenous technique were believed to be adequate and yet the incidence of hepatitis was high. The period reviewed was April 1 to Sept. 30, 1947; only male patients receiving intravenous arsenicals were investigated. Results were as follows:

	No. of Cases	No. Previously Under Treatment	No. of New Cases
Investigated	338	173	165
Observed for 6 months	242	135	107
Developing hepatitis	64 (26.4%)	28 (20.7%)	36 (33.6%)

"New" cases indicate those coming under intravenous arsenical therapy for the first time.

It will be appreciated that at April 1 a certain number who should have been still "under treatment" were lost to the series on account of hepatitis, with subsequent suspension of arsenicals. This could explain the discrepancy in the percentages 20.7 and 33.6.

Three of the "previously under treatment" cases of jaundice occurred in patients transferred from other clinics for continuation of treatment; all three developed jaundice within three weeks of their first attendance after transfer. This very short incubation period makes it unlikely that they received their infection at this clinic.

Only one death occurred among the 338 cases—from agranulocytosis believed due to arsenicals. The patient developed pneumonia with slight icterus and bile in the urine. This case is not included among those developing hepatitis. Patients receiving penicillin or bismuth and routine blood tests only were not included in the investigations.

Sterilization was conducted by boiling in a small electric sterilizer, which was also used for the blood-collecting and

bismuth syringes. Boiling took place in a room separate from the medical officer's examination and treatment room; the process was therefore not under his easy control. About fifteen syringes of the numbered "vim" pattern were available for intravenous therapy. For boiling, the syringes were dismantled and wrapped in gauze, and it was noted that they were not always completely submerged in the boiling water. Boiling times varied between 10 and 30 minutes. On completion of boiling the wrapped syringes were laid on a tray ready for use. Needles were similarly boiled and placed in a dish of distilled water. Preparation of the injection material in a gallipot was carried out by the male orderly, using distilled water from an upturned flask. The charged syringe was handed to the medical officer, who gave the injection. The syringe was then returned to the orderly, who washed it out with tap-water and placed it in the "dirty" bowl; this bowl contained distilled water, changed daily, and it was the practice to draw a few millilitres of the water into each syringe as it was placed in the bowl. Before wrapping a syringe for boiling, the water in it was ejected into the bowl again. No antiseptics were used at any stage of the procedure.

Preparation of intravenous material and charging of syringes was carried out on a bench behind the medical officer while he was examining patients and/or reading and writing case notes. It was observed that at the end of almost every session investigated the number of syringes in the "dirty" bowl did not correspond to the total number of injections given during the session. It was noted also that this occurred irrespective of the medical officer or orderly on duty and irrespective of any combination of the same.

Specimen observations are as follows:

Day 1: Morning Session

8.30 a.m.—Tray: Syringes Nos. Z535, 843, 0124. "Dirty" Bowl: Syringes Nos. 330, 7, 140, X130, Record.

9.15 a.m.—All syringes were boiled for 15 minutes.

10.00 a.m.—Session started, running to 12 noon.

12.15 p.m.—Tray: Syringes Nos. 843, 330, 0124, X130, 140, Record. "Dirty" Bowl: Syringes Nos. 7, Z535.

No boiling took place during the session. Seven intravenous injections were given and only two syringes, 7 and Z535, were used.

Day 2: Morning and Afternoon Sessions

8.30 a.m.—Tray: Syringes Nos. 843, 567, Z535, 330, Record, X130. "Dirty" Bowl: Syringes Nos. 140, 7, 0124.

9.15 a.m.—Syringes Nos. 0124, 140, and 7 were boiled for 20 minutes.

10.00 a.m.—Session started, running till 12 noon.

12.15 p.m.—Tray: Syringes Nos. 843, 567, Z535, 330, Record, X130. "Dirty" Bowl: Syringes Nos. 140, 7, 0124.

No boiling took place during the session. Five intravenous injections were given and only three syringes, 140, 7, and 0124, were used.

7.15 p.m.—Despite further intravenous therapy the arrangement at 12.15 p.m. still existed. Except for the 9.15 a.m. boiling, no boiling took place during the day.

Day 3: Morning and Afternoon Sessions

8.30 a.m.—Tray: Syringes Nos. 843, 567, Z535, 330, Record, X130. "Dirty" Bowl: Syringes Nos. 140, 7, 0124.

9.15 a.m.—Syringes Nos. 140, 7, 0124 were boiled for 15 minutes. No further boiling during the day.

7.15 p.m.—Tray: Syringes Nos. 843, 567, 7, Z535, Record. "Dirty" Bowl: Syringes Nos. 140, X130, 0124, 330.

Ten intravenous injections were given during the day, and only five syringes, 140, X130, 0124, 330, and Record, were used.

It was therefore obvious that syringes were used and re-used without adequate sterilization. Such routine was contrary to standing instructions.

Seventeen male sessions were held per week—six of one and a half hours and eleven of two hours. The average number of patients examined and/or treated per session was 37.

The possibility of demonstrating case-to-case transmission was frustrated by the irregular number of syringes used per, say, any ten patients and by the erratic boiling times. It could be shown that all new patients who developed jaundice had at least three of their intravenous injections on a day when patients incubating the disease were having similar treatment. Mondays and Saturdays were the days most in question, and it was noted that these were the two busiest days.

Incubation periods for the 36 "new" cases were: under 100 days, 14 cases; between 100 and 200 days, 17 cases; over 200 days, 5 cases. It is believed that the longer incubation periods are probably due to the patient's receiving a contaminated injection late in his course of treatment, but the possibility of a contaminated blood-collecting syringe being used early in the period of surveillance cannot be excluded.

Discussion

It must appear obvious that while the clinic technique may have the appearance of orderliness and cleanliness it is, in fact, far from being surgically clean—i.e., the system is "open" to the possibility of cross-infection at several stages. Proper sterilization and control are of paramount importance in a V.D. clinic, where the syphilitic patient is "needled" by all the methods recognized as being followed by hepatitis—i.e., intravenous, intramuscular, and blood-collecting. In this clinic the sterilizing capacity would appear to be inadequate and the number of syringes insufficient to allow of proper day-to-day cleaning and sterilizing. Boiling procedure is not easily controlled. The male surgery is badly laid out from the point of view of easy supervision of syringe charging and disposal. The number of patients attending per session, necessitating clinical examinations, writing of case notes, lumbar puncture, intravenous treatment, etc., is such that the medical officer has little time for supervising the details of the surgery routine. Previous observers have noted the high percentage of jaundice in large clinics and its relative absence in small clinics and in private V.D. work.

Possibilities of transference of hepatitis arise from the re-use of unsterilized syringes, the repeated use of the gallipot without sterilization, the drawing up of water from the "dirty" bowl into used syringes, and the inadequate boiling of syringes. The handling by the orderly of both dirty and clean material cannot be overlooked. Other possible sources of infection were syringes used for injecting penicillin and bismuth and for blood collecting.

An incidence of 33% of treated syphilitics developing hepatitis, with all its consequent loss of working hours, complications, and even death, is a heavy price to pay for the high-pressure organization. The full benefits of social work directed at bringing defaulters back under treatment are in jeopardy. While returning defaulters may survive the late complications of syphilis, a small proportion are liable to fall heir to the late complications of hepatitis, as pointed out by Damodaran (1948). Until, in clinics, the incidence of jaundice is taken as a measure of surgical cleanliness this preventable disease will persist.

From the foregoing it is obvious that the practical aim should be to convert the "open" system to a completely "closed" one. It is not enough to aim at thoroughly sterilized syringes only, very important though it be, but the other gaps must also be closed, so that a double check

is placed on all possible sources of contamination. As Batchelor says in a personal communication, "the standard of sterilization required is that used by bacteriologists, for example, for blood culture."

The following recommendations are made:

1. For each injection of penicillin, arsenic, and bismuth, or for blood collecting, a separate syringe and needle should be used.
2. That a room be set aside in the clinic for autoclave sterilization installations. After use, all syringes and needles should be washed out thoroughly with tap-water, completely reassembled, and placed in a test-tube with loose cotton-wool plugs at the bottom and the top cap. These test-tubes should be collected in wire baskets for easy use in autoclaving. The autoclave should be in charge of a competent State-registered nurse or specially selected orderly. Hot-air sterilization could be used. Failing such a self-contained arrangement, the adjoining hospital could be encouraged to set up a central sterilization-room. Not only would the clinic's needs be supplied, but lumbar puncture trays, catheter trays, syringes, etc., could be made readily available for use through the wards of the hospital. Further, laboratory material could be supplied sterilized and ready for use.
3. That a note of the number of the syringe used be made on the patient's record card.
4. That the lay-out of the male surgery be completely recast with a view to easy supervision.
5. That the medical officer should prepare the injections himself—i.e., handle all the clean material and the orderly the "dirty" only.
6. That the gallipot be dispensed with, and distilled water supplied sterilized in 20-ml. bottles with rubber-lined screw-cap tops. By this means each injection could be prepared separately and in a sterilized container.
7. That the "dirty" bowl be discarded.
8. That additional medical staff be available for peak sessions.

Summary

An investigation was made into the continued incidence of jaundice in a V.D. clinic where sterilization was believed to be adequate.

The faults in sterilization and technique are noted, together with the reasons for them.

Recommendations are made for proper sterilization and for conditions conducive to easy supervision and a simple technique.

A plea is made for immediate and routine action based on the greater sense of responsibility arising from an understanding of the accepted data.

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The Welfare Services Bill for Northern Ireland, which has recently been published, will come into force on Jan 1, 1949, if passed by Parliament. One of the principal provisions relates to the duty of providing residential accommodation for persons who by reasons of age, infirmity, or other circumstances are in need of care and attention not otherwise available to them. It is not proposed that they all ought to be encouraged to enter a home or hostel. A clause prohibits the provision of anything in the nature of hospital accommodation or services so as to prevent any chance of overlapping with the work of the Hospitals Authority and also to preclude the possibility of "chronic wards" developing. Everyone accepting accommodation must pay for it. Those who can will pay out of their own resources, while others will rely on National Insurance or National Assistance grants. The old test of destitution now disappears with the virtual disappearance of destitution itself. In addition, the Bill proposes temporary accommodation and emergency lodging of a short-term nature for persons who find themselves suddenly without a home because of such perils as fire, flood, or eviction. This, too, must be paid for.