

## OF CADAVERIC PARTICLES AND REVERSE TRANSCRIPTASE

## Lessons in the Control of Hospital Infection

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By some accounts, Ignaz Semmelweis was an abrasive and unpopular man.<sup>2,4</sup> His work, however, was impeccable. Appointed to the directorship of the obstetric service of Vienna's Lying-In Hospital, Semmelweis in 1847 began to systematically examine data on maternal deaths going back several decades. This led to a programme for monitoring complications prospectively. When the data were plotted out against the changing patterns of the hospital practice, he noticed the association of higher maternal mortality with a) the establishment of a school of anatomic pathology adjacent to the hospital; and b) wards where there were medical students. His conclusion that 'cadaveric particles' were causing puerperal fever led to his demonstration that hand-washing could limit the scourge. The very course of medicine could have been changed.

Semmelweis, unfortunately for all, felt that the mere rightness of his conclusions should be enough to win converts to his theory. He published no clear studies trying to convince the medical establishment. He took no pains to persuade the more powerful members of his hospital board. Before long he was out of a job, labelled an eccentric. His practices were ignored, the puerperal epidemic resumed, and Semmelweis, unacclaimed and

unhappy, died in 1865 of an infection.

Until this century, hospitals were places where patients with smallpox and tuberculosis lay in beds beside patients with every other type of disease. Small wonder that these establishments were regarded as 'deathhouses'.<sup>2</sup> The bacteriologic breakthroughs of Pasteur and Koch supplemented the clinical observations of others, and together these ideas pushed the field of infection out of the realm of magic and into that of science. Diphtheria, the number one killer of children until well into the 20th Century, stopped being equated with sin and became a disease caused by a gram positive rod.<sup>3</sup> Florence Nightingale returned from serving as a nurse on the front of the Crimean War, and pioneered safe, practical designs for hospitals in England. Johns Hopkins University in 1869 opened the doors of a joint medical school/hospital whose planning attempted to take into account the latest theories concerning microbes.

Antibiotics were introduced just before World War II. Doctors' new confidence that they had infection control well in hand was shattered with the emergence in the 1950's of staphylococcus aureus that was resistant to Penicillin. Hospital-based epidemics of this

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new staph ushered in the modern era of hospital infection surveillance. By 1970 in the United States it was beginning to be accepted that all hospitals should have a program for monitoring and controlling their hospital-acquired (nosocomial) infections. In 1976 an infection control programme became a requirement for accreditation of all U.S. hospitals. The emphasis would change from Penicillin-resistant staph to multi-drug resistant gram negatives to Methicillin-resistant staph to fungi. In 1981 a paper appeared in the *New England Journal of Medicine* that described rare tumors and infections in homosexual men in California. AIDS had arrived, and the vocabulary of hospital infection expanded to include reverse transcriptase, T4 lymphocyte counts, and universal precautions.

On March 5, 1991 in a conference room of P.D. Hinduja Hospital in Bombay, doctors lit a ceremonial lamp to commemorate the formation of the Indian Hospital Infection Society. Such societies had been in existence in Europe and the U.S. for over a decade, and many Indian hospital leaders had already been working at local levels in their own Infection Control Committees. The 1st Indian Conference on Hospital Infection, held for 4 days in Bombay, gave the opportunity for experience and thought from all across India to congeal into one body. Hospital Infection societies had recently been started in Singapore, Malaysia, and Indonesia.

The 171 delegates at the conference included mostly Indians - coming from centers in Vellore to Chandigarh, Poona to Patna - about 50% of whom were microbiologists, the remaining clinicians representing pediatrics, internal medicine, and surgery. Faculty from abroad, predominantly from the U.K., and from India as well, presented a scientific programme that mixed topics like in vitro drug resistance, perioperative antibiotic usage, and investigation of outbreaks. The discussions, which overflowed from the lectures into tea-time, were sometimes heated and expressed a common enthusiasm for fighting this problem. It was quite obvious to me that I was among many doctors who had struggled with hospital infection for some time and who were eager to

learn new tricks.

Well over 10% of inpatients will acquire a new infection while in the hospital - urinary tract infection, pneumonia, and wound infection being the most common. All across India, doctors are encountering bacteria particularly gram negative rods, that are resistant to multiple antibiotics. In India as across Europe, the indiscriminate use of antibiotics is a plague that leads relentlessly to bacteria that are responsive to none of our drugs.<sup>5</sup> An informal polling of the delegates in Bombay found rates of Chloramphenicol-resistant typhoid that were almost always over 60%.

How to set up an Operating Theater, a Central Sterile Supply Department, and a waste disposal system, all of which limit infection and do it for less money - this is the question that all developing world hospitals face. By formulating programmes of sensible antibiotic and disinfectant use, and by reducing nosocomial infections, which prolong hospital stays, an Infection Control Committee (ICC) can save a hospital administration money in the long run. Of course the savings in patients suffering is immeasurable.<sup>2,5</sup> There is general agreement that all hospitals need an ICC, and that hospitals over 250 beds should employ one full-time infection control nurse. The introduction of AIDS to the subcontinent underscores the need to have safe policies in effect before the time of crisis. One study in Bombay prostitutes showed the rate of HIV positivity going from 1.1% in 1987 to 21.0% in 1990.<sup>5</sup>

Who should be on an Infection Control Committee? Our 138-bed hospital in Kathmandu recently started an ICC composed of a physician (chairman); a surgeon; a GP/Staff Health Doctor; a junior resident doctor; three nurses: supervisor, OT in charge, ER in-charge; a pharmacist; a microbiology lab technician; and the housekeeping in-charge. This allows for large portions of the hospital to be represented, and we have seen a good deal of cooperation in our first months of existence. We work through questions such as:

1. How to convince staff to *wash hands* between patients? This has been impeded by the recent shortage of water. An interruption in the supply of water such as this, is all the excuse that many need to abandon the whole hand-washing idea completely.
2. *Should needles* be washed, 'sterilized', and re-used? One study at our hospital showed about 50% of nurses pricking themselves with a dirty needle in a given 2 week period.
3. What to do with biological and sharp waste when the incinerator is not always being used? Some have suggested a deep pit out back of the hospital.
4. How to convince doctors to use antibiotics sensibly, particularly in the perioperative period? Orders for Ampicillin and Gentamycin, 'prophylactic' running on for weeks, are too often the rule.
5. Can staff be persuaded that HIV positive patients do not pose an inordinate risk to others' safety, as long as several simple precautions are taken?
6. What is an inexpensive, reliable programme for staff vaccination against *Hepatitis B*?
7. Can the hospital drinking water be kept safe enough for just that: drinking?

The and other questions will not soon be answered, but we try to keep moving forward. If you have ideas of your own concerning Hospital Infection Control - any questions or advice - the author of this paper would be pleased to hear from you. Let us strive to learn from the experience of Ignaz Semmelweis: that victory goes not always to be who is right, but to he who adds patience, diplomacy, and communication to his claim.

## REFERENCES

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