

Is a bed centre in a hospital a hygienic hazard?

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SUMMARY

The contamination of linen and air in a bed centre, supply station and ward were compared, as well as the contamination of gowns used by the staff working in the 'clean' and the 'dirty' rooms of the bed-centre. The contamination of linen and air was low and there was no significant difference between the tested areas. The contamination on gowns used by the staff working in the 'dirty' room was significantly higher than that on gowns used by the staff working in the 'clean' room. This stresses the importance of dividing a bed centre into 'clean' and 'dirty' rooms. So organized, a bed centre does not seem to be a hygienic hazard.

INTRODUCTION

In modern hospital planning several functions are centralized to one unit, for example operating theatres, sterilization centres and bed centres which means a rational use of the personnel and the equipment. A centralized unit, however, is also a potential risk for cross infection. A bed centre may be an advantage from the hygienic point of view as the risk of contamination may be less in such a department than in a ward, since the linen is handled by fewer people who have no contact with patients.

The aim of the investigation was to study the level of bacterial contamination in a bed centre. Contamination of the linen was also compared between beds made in the department and those made in the wards.

MATERIAL AND METHODS

The bed centre and its routines

The various departments in Huddinge Hospital send beds from discharged patients, bedding and walking aids, etc., to the bed centre which cleans and stores them for the entire hospital. The bed centre consists of two completely separated rooms, a 'dirty' one for handling the used beds and a 'clean' one for making clean beds. While this study was running about 180 beds were made per day. Nine people were occupied in the 'clean' room and three in the 'dirty' room. They all wore a short sleeved gown. The beds arrive from the wards with only the plastic covered pillows and mattresses left on them. The staff in the 'dirty' room take off the plastic covers and push the pillows and mattresses without touching them through

a slit in the wall into the 'clean' room. Here new plastic covers are put on. The bedstead goes into the washing machine where it is washed in hot water (85 °C) and dried in warm air. The bed enters the 'clean' room through the washing machine and is made up there.

The supply station and its routines

The transport back to the ward is automatic to a supply station, which provides a specific area within the hospital with joint stock of consumables, laundry goods, sterile goods, beds and bedding, etc. On special 'supply rounds' the supply technicians top up the local storage units which are in the form of 'reach-through' cupboards. They also collect and send away dirty laundry and refuse.

The ward and its bedding routines

If a patient stays more than one week in a ward the linen of the bed is changed once a week. In between, the linen is changed when visibly dirty. The linen is taken from the 'reach-through' cupboards.

Sampling of textiles. In the bed centre samples were taken from pillow-slips from clean ready-made beds intended for the wards and the operating unit. In total 65 items were sampled during 11 days. The front of 40 protective gowns were sampled from the staff in the 'clean' room and the front of 30 gowns from the staff in the 'dirty' room. In two supply stations samples were taken from 37 linen items during 4 days. In two wards 12 items of linen in 'reach-through' cupboards were sampled during 4 days. From clean beds made in the ward, 33 pillow-slips were taken in 11 days. Samples were made with Rodac impression plates (5 cm diameter). Blood containing 0.5% Tween 80 was used for total counts and for sampling *Staphylococcus aureus* Baird Parker Medium (Oxoid) with egg yolk and tellurite was used. Five to six plates of each were used per item. The plates were incubated in 37 °C for 48 h. Student's *t* test was used for statistical analysis.

Air sampling. In the 'clean' room in the bed centre nine sedimentation plates were exposed. Four were exposed where the beds were made, three in the part of the room where ward beds were stored and two in the part of the room where beds for the operating unit were stored. Sampling was made during three working hours (8 p.m. to 11 p.m.) for 10 days.

In three supply stations five sedimentation plates were exposed for 4 h. Four 2 min samples with a slit sampler were made twice a day during the same period.

In two ward corridors three 2 min samples were made on two different days.

Petri dishes (15 cm diameter) with blood agar were used for sedimentation plates. Slit sampling was done with a Casella slit sampler with an airflow of 700 l/min. Presumptive *S. aureus* were tested for deoxyribonuclease production.

RESULTS

The contamination of textiles with bacteria is shown in Table 1. The highest mean total number of bacteria was 3.8 c.f.u./cm². This was found on the front of the gowns used by staff working in the 'dirty' room of the bed centre. In the 'clean' room the mean total number found on the gowns was 1.2 c.f.u./cm². Analysing the data from all experiments the difference was found to be statistically significant

Table 1. Contamination of textiles in the bed centre, supply station and ward

	Bed centre				Ward		
	Protective gowns		Linen from		Supply station linen	Linen from 'reach-through' cupboards	Linen from clean beds
	'Dirty' area	'Clean' area	clean beds				
Mean total no. bacteria c.f.u./cm ²	3.8	1.2	0.2	0.2	0.2	0.4	0.7
Items with <i>S. aureus</i> (%)	23 (7/30)*	15 (6/40)	6 (4/65)	5 (2/37)	8 (1/12)	20 (6/29)	

* Figures in parentheses indicate number of items with *S. aureus*/total number of items.

Table 2. *Air contamination in bed centre, supply station and ward corridor*

	Bed centre	Supply station	Ward corridor
Settle plates (mean no c.f.u./m ² /h)	446	409	not done
Casella slit sampler (mean no c.f.u./m ³)	88	59	104

($P < 0.001$). The contamination on linen was low in the bed centre, supply station and 'reach-through' cupboards, 0.2, 0.2 and 0.4 c.f.u./cm² respectively. On the clean beds in the ward it was slightly higher, 0.7 c.f.u./cm².

S. aureus was only found in small numbers, one or two per item. They were most often isolated from gowns in the 'dirty' area of the bed centre, 23%, and from clean beds made in the ward, 20% (Table 1). However the differences are not statistically significant.

The results of the air samples are shown in Table 2. Sedimentation was about 400 c.f.u./m²/h in the bed centre and the supply station. Measured with slit sampler air contamination varied between 60 and 100 c.f.u./m³.

DISCUSSION

When sampling bacteria from textiles there are several methods from which to choose. The most common are sweep plate, contact plate and vacuum sampling (Williams & Shooter, 1963). These methods sample surface contamination. More laborious is sampling by washing or homogenizing textiles. Using these methods the total number of bacteria is sampled.

For this investigation it was necessary to choose a method that could be used without interfering with the daily work in the bed centre and the ward. Sweep plates or Rodac plates are best from this point of view. Of these the Rodac plates seem to be the most efficient (Hambraeus, 1973). Pillow-slips were chosen when sampling from ready made beds to ensure that the items had always been handled in a fairly similar way.

There are some reports indicating that cross-infection due to highly contaminated hospital bedding may have occurred (Caplan, 1959). Modern bed linen, even blankets, is made from cotton which permits laundering at a temperature sufficiently high to disinfect and there is no risk of transfer of bacteria from patient to patient. It is well known though, that textiles are rapidly re-contaminated after laundering and this re-contamination begins in the laundry (Hambraeus, Bengtsson & Laurell, 1978a). The bacteria found are usually not those which cause infection. It has been shown, however, that during storage in wards textiles are also contaminated with *S. aureus* (Lidwell *et al.* 1974). Whether a bed centre is a risk or an advantage from the hygienic point of view is not known. According to our investigation the contamination of bedding is, if anything, slightly less in the bed centre than in the ward. It is interesting to note that the number of c.f.u./cm² found on linen in general corresponds to that found on the floors in the inner zone of an operating ward (Hambraeus, Bengtsson & Laurell, 1978b). On some occasions *S.*

aureus was found but at a very low rate. They were most often found on linen from clean beds in the ward. The difference was not statistically significant.

S. aureus was found on the gowns of the staff working both in the 'dirty' and the 'clean' room of the bed centre. The source of these is not known as samples were not taken from the upper respiratory tract of the staff. In spite of the fact that only the plastic cover was left on the beds, the gowns of staff working in the 'dirty' room were significantly more contaminated than staff working in the 'clean' room. This is not surprising considering the ease with which bacteria penetrate ordinary textiles. This stresses the necessity of having 'clean' and 'dirty' rooms with different staff in a bed centre. A bed centre organized in that way does not seem to be a hygienic hazard.

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