

## Volume 9, Issue 5 /2007 - Capacity Planning

### RFID Bed Management: Experience of the Insel Hospital Bern

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Like other large university hospitals, the Insel Hospital must face up to the twin phenomena of an inexorable rise in patient numbers and ongoing reductions in the length of the average patient stay. Not only does this trend create additional logistical requirements but it also results in increased bed turnover in the hospital's bed centres.

This development prompted the hospital to carry out a detailed analysis of bed management processes, including an evaluation of optimisation potential in this area. Our investigations found that bed management is a highly interdisciplinary and information intensive process that requires input from the bed centres, the hospital transport service, its workshops, and nurses on the wards.

The analysis found that information processing is the key to resolving the problem of continuous growth. Better dissemination of information has delivered improvements in bed planning with the result that the hospital has been able to maintain existing capacity, using fewer beds. Armed with this finding, we decided to seek a solution which offered improved information flow but did not add to the administrative burden of staff engaged in the bed management process.

Working closely with our external consultants and the Swiss Federal Institute of Technology Zurich, the hospital tested the viability of using RFID technology in bed management as part of a KTI project. In autumn 2005, we introduced a pilot project in cooperation with the urology clinic. Prior to commencing the project, the hospital's medical technicians performed a number of tests to exclude the possibility of RFID technology adversely impacting on medical- technical equipment and implants.

The pilot demonstrated the feasibility of generating the required information automatically. The match between the automatically generated information and the data produced in parallel on paper was found to be 99.9%. The new system functioned perfectly and no special measures were needed to achieve correct data transmission. A point of contact established to deal with faults or other adverse incidents has so far received just one incident report and this fault was later shown to have no direct link with the RFID technology.

Following the completion of the pilot project, the hospital issued an invitation to tender for the implementation of an RFID bed management system using a solution based on the same know-how and technology as was used in the pilot. This solution has been successfully commissioned and implemented.

The tender process revealed that the necessary know-how is provided by niche suppliers who have specialised in a number of key applications. Specialisation is confined in each case to a small number of fields, for which the supplier designs customised software solutions. The technical infrastructure itself will be marketed internationally.

During the implementation phase, it was decided for economic reasons to adapt the potential roll-out of the system as compared to the pilot phase. A number of modifications were made in the context of information concerning the latest position vis-à-vis beds. For this reason, we opted to fit antennae in bed centres and the storage facility but did not equip the wards.

The destination wards are recorded on a touchscreen unit when the beds are being prepared. The new system was designed to be able to adapt to emerging requirements and can, if necessary, be extended and upgraded.

1,600 beds, 1,000 mattresses and three bed management stations are now equipped with the RFID system. Every bed and/or mattress is fitted with a RFID chip (EN60601) approved for hospitals. RFID readers are set up in cleaning stations, stockrooms and upon bed delivery. The system infrastructure is linked to the hospital information system. Touchscreens and standard computers are used to visualise and capture data. The whole process is managed electronically and provides information in real time. This facilitates ISO audits and reduces legal problems in case of malfunctioning beds and errors.

The automatic capture of data also relieves of routine tasks hospital staff in charge of management, transportation, maintenance, accountancy and cleaning. We expect the RFID bed management system to meet the challenges arising from increasing bed turnover for several years, without increasing staff levels or adding to their workload. This has become feasible because the system has released staff from performing administrative tasks.

As the hospital is constantly aware of the location of all its beds, it should be possible to meet current bed capacity needs using 20% fewer beds. This should deliver substantial cost savings during the current phase of bed replacement.

Finally, the hospital will reduce labour costs and expenditure on cleaning materials because cleaning and disinfection procedures for beds and mattresses will differ depending on the length of occupancy.

These savings should cover the system's investment costs within two and a half to three years, a reasonable expectation when introducing new technologies.

According to Bernhard Leu, management director at the Insel Hospital, the efficiency improvement potential represents approximately 200,000 euros over 2 years. This basic figure relies on a reduction of beds in stock (50 beds x 3,000 euros), the saving of one employee salary (50,000 euros), automatic invoicing, which results in saved working hours (12x10x100 euros) as well as other benefits to the amount of 10,000 euros.

Staff members in the bed centres identify strongly with the project and are impressed with the solution. In fact, they see the new system as enhancing the status of the work they do. Transport, repair and nursing staff understood and accepted the solution quickly and training requirements were minimal owing to the simplicity and user-friendliness of the system. The system has been in operation since May 2007 and a product costing analysis will be carried out in November 2007. The results of this review will be published at a later date.

Published on : Mon, 24 Dec 2007