# SYMPOSIUM ON
## Single Bed Ward Accommodation

A publication produced by Welsh Health Estates, in collaboration with IHEEM Welsh Branch, for health estate personnel in Wales

**Hilton Hotel, Cardiff • 14th June 2007**

<table>
<thead>
<tr>
<th>In this Issue</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>Professor Roger Ulrich</strong></td>
<td>6</td>
</tr>
<tr>
<td>Effects of Single Versus Multi-bed Accommodation on Outcomes</td>
<td></td>
</tr>
<tr>
<td>• <strong>Dr Mike Simmonds</strong></td>
<td>9</td>
</tr>
<tr>
<td>Single Rooms and Healthcare Acquired Infections</td>
<td></td>
</tr>
<tr>
<td>• <strong>Patricia Young</strong></td>
<td>10</td>
</tr>
<tr>
<td>Single Rooms and Patient Safety</td>
<td></td>
</tr>
<tr>
<td>• <strong>Antoine Buisseret</strong></td>
<td>12</td>
</tr>
<tr>
<td>The French Experience</td>
<td></td>
</tr>
<tr>
<td>• <strong>Alex Howells &amp; Wendy Warren</strong></td>
<td>14</td>
</tr>
<tr>
<td>Single Rooms - A Catalyst for a New Model of Care</td>
<td></td>
</tr>
<tr>
<td>• <strong>Jonathan Millman</strong></td>
<td>18</td>
</tr>
<tr>
<td>The Hillingdon Hospital Single Room Pilot Project</td>
<td></td>
</tr>
<tr>
<td>• <strong>David Hastie &amp; Dr Imelda Hametz</strong></td>
<td>20</td>
</tr>
<tr>
<td>Developments in Scotland</td>
<td></td>
</tr>
<tr>
<td>• <strong>Dr Bernard Place</strong></td>
<td>22</td>
</tr>
<tr>
<td>Pembury PFI Hospital: Single Beds - The Decision Making Process</td>
<td></td>
</tr>
<tr>
<td>• <strong>Professor Roger Ulrich</strong></td>
<td>24</td>
</tr>
<tr>
<td>Single Rooms and the Hospital of the Future</td>
<td></td>
</tr>
<tr>
<td>• <strong>Matthew Bending</strong></td>
<td>26</td>
</tr>
<tr>
<td>Cost Effectiveness of Hospital Design</td>
<td></td>
</tr>
</tbody>
</table>
Once again the Cardiff Hilton was the venue for another prestigious event held on 14 June 2007. Described by one delegate as “An excellent day, one of the best conferences I have attended”, the Symposium on single bed ward accommodation was jointly organised by Welsh Health Estates and the Welsh Branch of the Institute of Healthcare Engineering and Estate Management.

The subject of single rooms as a possible model of care in the NHS in Wales had been highlighted by Professor Roger Ulrich of the Texas A&M University, USA 15 months earlier at the Healthcare Estates Welsh Conference and Exhibition. His two presentations raised considerable interest at the time and were the catalyst for the recent Symposium.

The event brought together both estates and clinical professionals, something rare in the context of estates-led events. Over 100 delegates, drawn from NHS Trusts, Local Health Boards, the Welsh Assembly Government and private sector design and construction professionals across Wales, had a unique opportunity to attend a whole-day event dedicated to a single subject which, over recent years, has generated huge interest in the UK and beyond and, in some cases, polarised healthcare professionals into the multi-bed versus the single bed camps.

Wishing to take maximum advantage of this unique occasion, the organisers developed a full programme of presentations designed to cover the subject from a number of local, national and international perspectives. This allowed delegates to form their own views concerning the merits, or otherwise, of single rooms in the delivery of 21st century healthcare. Professor Roger Ulrich of the Texas A&M University, USA, highlighted the subject earlier.

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Roger Ulrich once again had the arduous task of speaking not once but twice, providing an update on his research into the benefits of single bedrooms and an insight into their likely impact on hospitals of the future. Other speakers covered the topic from the perspective of specific hospital sites such as Alex Howells and Wendy Warren on Ysbyty Ystrad Fawr and Ysbyty Aneurin Bevan, Jonathan Millman on Hillingdon Hospital and Dr Bernard Place on Pembury Hospital. Broader issues were addressed by Patricia Young of the National Patient Safety Agency and Matthew Bending of the York Health Economics Consortium with an international perspective being given by David Hastie and Dr Imelda Hametz from the Scottish Executive and Antoine Buissere of bdpGroupe6, France. At very short notice Dr Mike Simmons, substituting for an indisposed Tracey Gauci of the Welsh Assembly Government, probed the audience in his inimitable way on their understanding of infection control.

The venue with its very comfortable facilities and excellent food went a long way to ‘oiling’ the proceedings and maintain delegates’ focus on the topic, evident in the lively question and answer sessions. Such was the interest that Phil Nedin, President of IHEEM and Chair for the afternoon session, had difficulties in drawing the proceedings to a close!

In setting the scene, Nigel Davies, Assistant Director of Estate Development at Welsh Health Estates and Chair for the morning session, reminded delegates that they had been given a unique opportunity to shape the NHS for the next 50 years in the context of a substantial increase in capital expenditure promised by the Assembly over the next ten years. Nigel also reminded delegates that the Assembly policy in Wales is that Trusts should consider a minimum 50% provision of single bed room accommodation for all new acute facilities, as set out in current Health Building Notes. Responsibility for the actual percentage rests with NHS Trusts.

Welsh Health Estates and IHEEM Welsh Branch are grateful for the significant contribution made by each presenter to ensure the success of the event. This involved some considerable travelling not only from within the UK but also from as far as France and Sweden. The enthusiastic support of delegates from across Wales and beyond also needs to be acknowledged and the positive feedback and requests for further topic-focused events is encouraging.
The contribution of Gwent Healthcare NHS Trust to the event is worthy of particular mention. Since the Healthcare Estates Welsh Conference in March 2006, the Trust has gone beyond the theory of single bed ward accommodation and led the way in Wales in developing a model of care based on 100% single rooms. The departure from traditional multi-bed ward hospital layouts requires brave leadership decisions based, whenever possible, on strong evidence and, on occasions, requiring a leap of faith based on the belief that some things just make sense. The work currently undertaken by the Trust will, in the not too distant future, be evident for all to see, as two of its pathfinder hospitals in Ystrad Mynach and Ebbw Vale become a reality.

What follows in this special edition of The estate we’re in are summaries of the presentations given at the symposium, prepared by Peter Wiles and Ann Konsbruck at Welsh Health Estates. The original presentation slides can be found on the Conference and Seminar pages of the Intranet at http://howis.wales.nhs.uk/whe and Internet http://www.wales.nhs.uk/whe
It was a great pleasure to welcome Professor Roger Ulrich back to Wales as the lynchpin of this exciting Symposium and as an acknowledged worldwide expert on single rooms and evidence based design. His inspiring presentations at the Healthcare Estates Welsh Conference, held in Cardiff in March 2006, stimulated the debate in Wales and led directly to the setting up of this event in 2007.

Roger began his first presentation of the day by highlighting the importance of the Welsh programme of hospital and healthcare construction, one that will take a number of years to complete but will directly influence the lives of almost everyone in Wales for the next two or three generations.

Some of the issues discussed included:

- Safety - with particular emphasis on infection rates
- Patient privacy and dignity - a big issue in the UK
- Family presence - an issue of increasing international importance
- Patient satisfaction
- Staff/Work effectiveness and satisfaction - Staff need to be satisfied and retained
- Staffing requirements of single bed rooms versus multi-bed rooms

Any discussion of architectural or building intervention for healthcare has to begin by setting the context and the driving priority in any country is patient safety. Data for the United States shows that 1,800,000 hospital acquired infections killed almost 100,000 people in 2006 and tens of thousands die annually from preventable medical errors. There is also a 20% nursing turnover, about the same as in the UK, another big contributor to low levels of safety. “Simply being admitted to a hospital is a major cause of preventable death.”

How do we help mitigate these steadily escalating problems?

Healthcare associated infection

There is an escalation of antibiotic resistant strains of pathogens such as MRSA and C.difficile. Even if one were to reach a point where these could be eradicated from hospitals there would still be a problem and a strong need for single rooms in new hospitals because these antibiotic resistant strains, and this cannot be over emphasised, have become endemic in our communities, particularly from people being admitted to hospitals from nursing homes. In one sample 58% of people admitted to acute care hospitals from nursing homes were carrying some type of antibiotic resistant strain.

Single rooms enable patients to be separated upon admission, making it possible to prevent unrecognized carriers of pathogens from infecting others in multi-bed spaces. They are also vastly superior to multi-bed rooms in managing air changes, air pressure and maintaining clean air, thereby controlling or reducing airborne infection such as TB, or aerosol droplet spread infections such as SARS and also in the growing percentage of patients who are immune compromised. The future is one of escalating acuity. Those who are in hospital are sicker, more vulnerable, more immune compromised than ever before and single rooms with good air can be the right place for such patients.

Professor Ulrich showed his now famous image illustrating the surfaces commonly contaminated by MRSA in a multi-bed ward. The completely occupied ward is fully staffed and they are careful and assiduous about all procedures and hand washing but one patient unknowingly has MRSA or C.difficile. Test results can take two to three days to be returned but in two to three hours the ward is already contaminated including work tables, computer keyboards, equipment switches and curtains, which are generally washed infrequently. There is a 91% - 93% chance of clinical staff transmitting infection to another patient after touching one of these contaminated surfaces. Microscopic skin scales are another form of contamination which can travel from 15 to 60 feet, with the larger ones carrying a lot of MRSA or C.difficile. Research shows that isolating patients in single rooms after waiting for diagnosis did not reduce MRSA acquisition rates.

Single rooms are easier to clean and decontaminate after patients are discharged and private toilets are not just a
nicety for privacy and dignity, they are one of the few proven ways of halting C. difficile or Norovirus.

Many studies in scientific and medical journals compare outcomes for patients in terms of infection in multi-bed rooms compared to single bed rooms and nearly all of them report that single rooms are associated with lower infection rates. From a strictly scientific standpoint one cannot say this is just because it is the single room that has changed but other factors change as well including a higher ratio of hand washing basins and better air quality. The evidence points to single rooms reducing infections, both air borne and those that are contact transmitted.

**Hand Washing**

Low hand washing is a notorious problem in all healthcare systems and is widely recognised as contributing to high rates of infection. Compliance is difficult and audits of busy units show low rates, typically 14 to 28%. In recent years it has been suggested that architects can play a positive role in providing more and better located, from the standpoint of convenience to staff, hand washing facilities which can lead to large sustained increases in use and can be more effective than education programmes alone. Single rooms foster better access to washhand basins and alcohol rub than a multi-bed ward which will typically have only one sink, inconveniently located. Occasionally island sinks have been dropped from the ceiling in high acuity spaces, one for each bed so that nurses must pass the sink en-route to the patient’s head, as at University College London Hospital, but it is extremely expensive. Single rooms make it possible to put a sink where staff, who are busy and preoccupied, can’t miss it, always next to their movement path and in their field of view as they approach the patient. From Professor Ulrich’s own observations in English hospitals nurses commonly have to walk 12 to 14 paces to a sink which is outside of the field of view. Busy, preoccupied people can hardly be expected to wash their hands very often in that situation.

“The evidence points to single rooms reducing infections, both air borne and those that are contact transmitted”

**Patient observation**

The design of buildings can have a large positive impact in making patients safer. It is a myth, perhaps understandable in thinking of traditional single rooms, that single rooms prevent observation of patients and worsen safety. Well-designed, decentralised nursing stations, combined with single rooms, improve visual observation of patients and thereby enhance safety.

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare associated infections</td>
</tr>
<tr>
<td>Medical errors</td>
</tr>
<tr>
<td>Falls</td>
</tr>
<tr>
<td>Staff observation of patients</td>
</tr>
<tr>
<td>Staff/patient communication</td>
</tr>
<tr>
<td>Confidentiality of information</td>
</tr>
<tr>
<td>Presence of family</td>
</tr>
<tr>
<td>Patient privacy and dignity</td>
</tr>
<tr>
<td>Avoid mixed-sex accommodation</td>
</tr>
<tr>
<td>Death with dignity</td>
</tr>
<tr>
<td>Noise</td>
</tr>
<tr>
<td>Sleep quality</td>
</tr>
<tr>
<td>Pain</td>
</tr>
<tr>
<td>Patient stress</td>
</tr>
<tr>
<td>Patient satisfaction</td>
</tr>
<tr>
<td>Choice</td>
</tr>
<tr>
<td>Staff satisfaction</td>
</tr>
<tr>
<td>Staff work effectiveness</td>
</tr>
<tr>
<td>Reducing room transfers</td>
</tr>
<tr>
<td>Adapt to handle high acuity</td>
</tr>
<tr>
<td>Managing bed availability</td>
</tr>
<tr>
<td>Initial construction costs</td>
</tr>
<tr>
<td>Operations and whole life costs</td>
</tr>
</tbody>
</table>

**Stress of shared rooms**

Scientific data is clear that, in the main, room mates are a major source of stress, they do not provide stress-reducing social support. Rooms might be of mixed gender, patients may not be friendly, they may be seriously ill, they can keep others awake at night. This is a toxic mix for lack of dignity, privacy and patient satisfaction. Britain is the only nation with an advanced healthcare system that inflicts this serious stressor on its patients. Other countries with multi-bed rooms in the main do not have such a problem because they run their hospitals at much lower bed occupancy rates, approximately 75/80%. With multi-bed rooms you can have people dying in a crowd of mixed gender in the most undignified circumstances. This is easily avoided by providing single bed rooms.
Patient transfers

In the United States, where they still have 42/44% of patients in two-bed rooms, about 15 to 20% of all transfers result from incompatibility among room mates.

Transfers:
- increase infections
- cause peaks in medical errors because of communication discontinuities
- are a major cause of staff injuries for manual lifting
- require hours of work with each transfer
- add about half a day to length of stay

A single large room enables more procedures to be brought to the bedside, saving money and reducing medication errors.

Staffing levels and family involvement

A common myth is that single rooms require more nurses. Scientific studies and decades of experience in several other countries with single rooms completely contradict the notion that single rooms require higher staffing. Some staff may not like the change to single rooms as there could be dramatic changes in working pattern, including more contact with the family but, in the most conservative case, staffing levels don’t change.

Single bed rooms are vastly superior for promoting social support from family, a key driver of satisfaction and choice and something that has to be included because there is a world-wide shortage of nurses and other clinical staff. The only way over time, given the rise in population and demands in healthcare, to serve these individuals, is to get the family more involved. In addition, research shows that contact with caring, emotionally supportive family and friends reduces patient stress and improves medical outcomes and is a strong positive factor in patient satisfaction and choice.

Communication

A recent study on communication with the World Health Organisation showed that this is a huge issue and communication is worse, other things being equal, in multi-bed rooms than single bed rooms because staff consciously or unconsciously censor what they say.

Poor communication:
- elevates patient and family anxiety and stress
- is considered by patients one of the worst stressors
- worsens outcomes

A curtain has no measurable effect on sound reduction; it is one pervasive confidentiality breach. NHS staff are being asked to do the impossible. They are being asked to communicate much better, which is important because it improves outcomes, but also “Don’t breach confidentiality; we have to emphasise patient privacy”. Conventional multi-bed designs make it nearly impossible for patients to have adequate privacy and dignity or for staff to communicate with patients without violating confidentiality guidelines. The only type of room that allows staff to do their job in both areas is a single bed room.

In conclusion Professor Ulrich provided data from the United States that shows that patients are more satisfied with care when they are in single rooms rather than multi-bed rooms and likewise the vast majority of British patients prefer single-bed rooms, especially if they have experience with such rooms. In a range of issues, shown in the table on the previous page, single bed rooms are better. The only area where there may be an initial disadvantage is in the short term construction costs and it is not a great deal. Other countries in Europe and America are now requiring nothing but single rooms in all new construction.
A lighter mood was injected into the day by Dr Mike Simmons, formerly Deputy Chief Medical Officer for Wales at the Welsh Assembly Government and now Director of Health Protection with the National Public Health Service for Wales (NPHS), who was deputising at very short notice for an indisposed Tracey Gauci.

Taking charge of the roving microphone, Mike proceeded to question the audience, who he established was made up of clinicians, estates and management personnel, on their knowledge and understanding of infection control. Of the small sample of answers to his questions such as ‘How important do you think healthcare associated infection is?’ “What’s happening to healthcare associated infection rates in your hospital?” “What do you think the commonest infection is in your Trust?” he established that there were a lot of misconceptions around the subject.

What is clear is that the agenda has changed: The issue of single rooms is no longer one simply to be considered from the point of view of infection control teams. There is now a more holistic approach as to why single rooms are important.

Delegates were encouraged to look at the results of the Prevalence Surveys conducted on healthcare associated infection (HAI) in all Trusts and available from the NPHS website http://www.nphs.wales.nhs.uk to see how infections are progressing in Wales.

The Welsh HAI strategy is very different from that of the rest of the UK. In Wales there isn’t a target to reduce MRSA by 50% as is the case in England and yet Wales is on target to achieve it. Why is that? The strategy in Wales is one of concentrating on all aspects of HAI rather than homing in on the latest organisms such as C Difficile. The prevalence data shows that the most common infections are still those that always have been common, that is, urinary and respiratory tract infections, both associated with nursing care and neither of which has anything to do with MRSA or C Difficile.

Mike highlighted the work being undertaken by the Welsh Healthcare Associated Infection Sub Group, lead by Tracey Gauci on the subject of single room isolation, although purely from an infection control point of view. He confirmed that “it will come as no surprise that the recommendations [of the sub group] are in accord with what you have heard today”.

Certainly the Group will be recommending to the NHS Management Board that in any new build there should be 100% single room accommodation. Although that would be the aim, circumstances may reduce that to 85%. For refurbishment schemes the figure would be 85% with a minimum of 50%. He stressed that these were recommendations yet to be approved by the Assembly.

Not all single rooms would require negative pressure ventilation since the NHS is able to manage the majority of the organisms. Negative ventilation, however, does have a place, particularly in relation to respiratory infections. A recent survey of isolation room facilities by Welsh Health Estates has shown that there are problems across Wales with filters, controls, maintenance, etc. The Sub Group will probably also be recommending that the provision of this type of room should be assessed on a regional basis, fitting in with the Designed for Life plans and reconfigurations, although the definition of ‘region’ had yet to be debated.

How could this be achieved? Mike’s advice to delegates was “we do it through the holistic approach we have here”. Everyone is beginning to recognise that the issue of single rooms is not just about infection control. There are all the other issues addressed during the Symposium such as safety, patient satisfaction and even visitor satisfaction.

Mike recognises that Chief Executives are much exercised about the constant competing targets that have to be met. There are waiting list targets, bed occupancy targets, infection reduction targets and all of these must go in the melting pot in terms of management. However, the bottom line is that reductions in healthcare associated infections have a major part to play in achieving these targets.

Mike’s parting words were “reducing healthcare associated infections has too many benefits to be ignored but I want to see it alongside all these other issues that we are debating today, around why single room isolation makes good sense.”

WHE Internet website: www.wales.nhs.uk/whe
Patricia Young
Single rooms and patient safety

Patricia Young, Design Specialist for the Built Environment at the National Patient Safety Agency (NPSA), took delegates on a voyage on the 3900 passenger Freedom of the Seas, the largest passenger ship in the world and illustrated its many similarities with a hospital. It provides 24-hour medical care, deals with infection control issues, it incorporates complex environmental systems, it is operated by specialist staff, periodically faces untoward and unanticipated events and deals with an ageing population. The similarity ends in its provision of 100% single family room occupancy. Passengers are not expected to share a room with a complete stranger.

During the Crimean War Florence Nightingale cut field hospital mortality rates from 60% to 2% in 3 months. So, if we have known about patient safety for over 150 years why, in acute care, do 11% of admissions suffer an incident? NPSA statistics show that from 1367 incidents reported, 89% relate to an unsafe environment. We have a 1 in 3,000,000 chance of dying in a plane crash but a 1 in 300 chance of dying while receiving acute care.

The main role of the NPSA is to capture and analyse patient safety incidents and then to effect some form of change to reduce their occurrence. Einstein said, “only two things are infinite: the universe and human stupidity and I am not sure about the former”. To illustrate the point Patricia showed some examples of potential safety issues including a badly positioned security gate, confusing door handles and equipment stuffed into a trolley where it was impossible to tell whether the devices were charged, clean, serviced, or even working.

So what do we do? Do we change the system? Do we design out the problem? We need an open and fair culture so that errors can be reported and learnt from. However, culture change does not occur through training programmes and new policies alone. Products and the physical environment must also change.

A truly inclusive design process focuses on precarious events and addresses latent conditions with patients, families and staff being involved from the beginning, not half way through the project.

Errors in healthcare occur for a variety of reasons, the main ones being medication errors, slips, trips, falls and hospital acquired infections. The current evidence is quite conclusive with factors such as reducing noise levels, providing high levels of observation and improving ventilation, resulting in a reduction in the rate of patient safety incidents.

A vital element of evidence-based design is assessing the results and determining if the design has proved effective in reducing the level of unintended harm to patients, and the NPSA are working on a variety of indicators to achieve and measure this.

Evidence recently identified in an NPSA-commissioned literature review does not suggest that single patient rooms reduce staff to patient observation or that it increases staff travel distances or the occurrence of falls. The evidence suggests that this only happens when there is sub-optimal design of the ward environment.

Why is design important? One cannot change the human condition; one can only change the conditions in which people work. People make mistakes, it is human nature and understanding this is the key to safe design.

These five key principles of safe design should form part of any design brief in healthcare:

- **Team** - Early and continuous engagement of stakeholders
- **Process** - Design around major organisational processes
- **Hazards** - Identify and mitigate against
- **Principles** - Focus on systems
- **Evaluate** - Evaluate the design with real users and learn

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From the current evidence-base, in almost all situations, in terms of safety, the arguments for 100% single patient rooms including reduction in healthcare associated infections, family support, patient stress, noise and sleep deprivation, is rather overwhelming.

The objections against the use of 100% single bed rooms are based on concerns associated with increased capital cost, staffing levels, travel distances, patient observation, and possible feelings of isolation and alienation. The NPSA recently commissioned an analysis of the reality of these concerns and amongst the conclusions drawn was the consideration that if single patient rooms are to be selected then a variety of indirect considerations have to be made.

As single bed ratios are increased capital costs rise. A point can be reached, however, beyond which the philosophy of care and operational management may have to change. Single rooms become multi-purpose and used, for example, for family-centred care which may start to eliminate the need for separate ancillary spaces such as day rooms and treatment rooms. A clear understanding of what care treatments are more suited to single patient rooms needs to be established. And at this tipping point cost, both capital and operational, should reduce.

After cost, travel distances and ease of observation are the most debated points. However, by designing out the problem the primary benefit of improved patient safety and satisfaction can be achieved. For example, when rooms are designed in a radial layout nurses walk 9.66 feet per minute but if wards are designed with long corridors they walk 33 feet per minute.

So, what are the key drivers for designing for patient safety? Designing for patient safety is no different from just good design. But, there are some aspects which should receive more attention than others. Key drivers for patient safety include:

- Observation by staff from the corridor; but of equal importance, observation by the patient of the activity outside the room to combat feelings of isolation
- Patient-specific drugs and linen storage
- External and internal views
- Decentralised nurse base

“From the current evidence-base, in almost all situations, in terms of safety, the arguments for 100% single patient rooms is rather overwhelming”

- Standardised equipment
- Standardised environment
- Access to patient
- Relative location of en-suite
- Patient-specific clinical work area
- Acoustically absorbent finishes
- Handrails
- Impact-absorbing flooring
- Air treatment systems
- Patient ambience controls
- Family area
- Inclusion of art
- Built-in furniture

When rooms are standardised, in an A&E setting for example, staff always know where to find equipment and how to use it. This reduces the chance of a patient being harmed due to time lost while staff familiarise themselves with the room or the equipment. Most trips, slips and falls occur between the bed and the en-suite, therefore it is beneficial to minimise the travel distance between the two, provide hand rail support, and put the bed head on the adjacent en-suite wall.

Designers are creative by nature but it is essential as clients to raise the patient safety agenda by bringing it to the forefront of the briefing process so that it becomes an integral part of the business case for the delivery of healthcare.

“If you think you can’t afford good design ask yourselves how much does bad design cost?” was the challenge Patricia put to delegates. Anyone who thinks the NHS can’t afford to buy good design should consider that bad design contributes to the harm of 900,000 patients every year at an estimated cost to the British tax payer of £3.4b, roughly 5% of the entire NHS budget.

Quoting Don Berwick of the Institute of Healthcare Improvement, Patricia reminded delegates that “Every system is perfectly designed to achieve exactly the result it gets”. There is no doubt improving patient safety will require a change of the highest magnitude but one day we will all be heavy users of healthcare and it is very much in our interest to sort this out now.

WHE Internet website: www.wales.nhs.uk/whe
A French perspective to the day was given by Antoine Buisseret, an Associate at the architectural practice bdGGroupe6.

After a brief historical view of French hospital design, Antoine concentrated on new hospitals at Arras and Clermont-Ferrand. In 1977 the practice won a competition to provide the first national plan for hospital modernisation in France with a target of an economic, standardised, repetitive hospital plan providing 40% single bedrooms and 60% double bedrooms.

Thus began their concept of the modern hospital with a central medical core (plateau technique) separate from the ward accommodation and with separate circulations for logistics, medical staff and visitors.

Moving forward to 2002 and the 560 bed Arras hospital and 540 bed, Clermont-Ferrand. Each project has 90% single rooms, of which 10% are disabled rooms, and 10% double rooms. However, more recent design briefs are being based on 80% single bedrooms and 20% double rooms to achieve greater economy. Each of these hospitals uses the plateau technique but with two ward design solutions, finger and monobloc with both inboard and outboard en-suite facilities.

The Arras project, with an area of 75,500 m² and costing €99.5m is based on the monobloc plan with a medical and logistics core in the centre, a circular corridor and wards on the outside. It has outboard en-suite facilities to optimise the visibility from staff to the patient.

As opposed to Arras, Clermont-Ferrand is based on the finger ward organisation. The medical and logistics core is outside of the ward, shared between two wards and linked to the ward fingers. This bedroom plan has inboard en-suite facilities to maximise outside views. An interesting feature of the design is the flexible ward limits that can optimise the occupation rates depending on the needs of the patients.

Clermont-Ferrand, which is on site at the moment and should be finished at the end of 2009, has a budget cost of €140m and an area of 70,000 m².

An important feature in the evolution of design briefs is that much treatment now takes place directly in the room and although the area of single rooms and en-suite remains constant, between 16-18 m², the en-suite has evolved from 3 m² to 4.5 m², the main reason being that all en-suites now have disabled access.

A brief review of French space standards showed:
- 20-30 beds per ward
- 80% single bed rooms
- 20% double bed rooms

Room area (en-suite included):
- Single bed room: 17 m²
- Double bed room: 21-24 m²

Corridor widths:
- 180 cm (to allow 1 bed and 1 trolley to pass)
- 240 cm in front of door (to allow for 2 beds to pass in corridor plus space to allow bed to turn and enter room.)

Door size:
- 120 cm single leaf

The typical brief for a French ward is:

Reception
- 1 x medical hot desk office 12 m²
- 1 x waiting area 12 m²
- 2 x wc’s @3 m²

Patient Area
- 20 x single bedroom with en-suite @18 m²
- 4 x double bedroom with en-suite @24 m²
- 1 x domestic bathroom 9 m²

WHE Intranet website: howis.wales.nhs.uk/whe
Occasionally wards are provided with clinical treatment and patient day rooms and the circulation, planning and engineering allowance is typically 40-60% of net ward area.

Although the average length of patient stay is now no more than 2-3 days, with the rise in obesity in the population, designing bedrooms is becoming a problem as bed size is increasing to 130 cm x 210 cm. The larger room dimensions require an increased structural grid and movement of patients is done with a lifting track built into the ceiling.

Within the ward environment a standard bed ward of 30 beds is managed by three or four nursing staff, located within a centralised staff base, but the ward design means only a maximum distance of about 25 m from nursing office to bed.

Antoine illustrated a typical ward organisation with a PFI competition project of about 250 beds. The medical and logistics core is outside the wards, which are based on the finger plan, and consist of two 26 bed wards and a single finger of 13 beds with the medical and logistic core separate from visitor traffic. There are also flexible limits between different wards giving flexibility to manage patient rates.

The quality of light for patients and staff during the day is very important and the staff base within the ward includes a lot of daylighting. Medical treatment is undertaken within the bedrooms, which are ergonomically designed, with hygiene issues in mind and allow staff to have a great deal of personal contact with the patient.

The design has created wards “which are more like a hotel”, which respect the intimacy of the patient, optimise the personal relations between patients and staff, and give the private and personal space a domestic ambience compared to the medical ambiance outside the ward. In addition, a patient in a single room can control their own environment, lighting, heating and ventilation, compared with a multi-bed room.

In the example shown, a lot of work had been done on the façade to visually extend the room and increase the spacious feel by exploiting the external view. The use of softer, natural colours that are very easy on the eye also create a quieter, more peaceful environment. Signage can also be used to develop the mood and ambiance for patients to increase the feeling of being outside the hospital. Antoine showed examples using natural themes such as plants and animals to identify floors and rooms.

In 2005 bdpGroupe6 undertook a comparative study of the Glenfield Hospital in Leicester comparing the PFI brief of 50% single rooms and 50% four-bed bays, against 100% single rooms to see the impact on space area. It was interesting to see that the results showed the floor areas were similar, as was the price, demonstrating that it is feasible to have 100% single bedrooms.

In summary, 100% single rooms can be provided without a significant increase in floor area and provide more flexible design solutions, especially with regards to single sex accommodation.

WHE Internet website: www.wales.nhs.uk/whe
Alex Howells & Wendy Warren
Single rooms - A catalyst for a new model of care

Alex Howells, Director of Planning and Wendy Warren, Nurse Director, of Gwent Healthcare NHS Trust shared their experiences of the decision making process that will result in 100% single rooms for the pathfinder hospital developments in Gwent.

Alex started with a brief overview of the strategic direction of the project, of which single rooms, although important, are just one component of a radical change. The current range of services provided to the population of between 550,000 and 600,000 is very fragmented with considerable duplication resulting in an inability to use the capacity appropriately. In looking to the future it was clear that things could not stay as they were.

The capital investment over the last 10 years in Gwent had mainly been used to patch up the existing facility, with 90% of the estate being well over 10 years old and with a backlog maintenance bill of nearly £70m. Even if they were not embarking on the strategic programme of change, the estate is in need of replacement.

There are two main proposals for the future. Firstly to improve access to services for patients through developing more services out of hospitals and secondly to improve the quality of care by consolidating the very specialist critical care services in one location. To achieve this the patient pathways need to be rebalanced, bringing services closer to patients and making sure all aspects of that pathway are connected. A different infrastructure is needed to support the change which will be achieved by a specialist Critical Care Centre being sited at the centre with a network of supporting Local General Hospitals.

Two of these Local General Hospitals, with a capital investment of £180m, are actually coming to full business case stage; in Caerphilly, with the approximately 270 bed Ysbyty Ystrad Fawr and Ysbyty Aneurin Bevan, with approximately 110 beds, in Blaenau Gwent.

Alex Howells, Director of Planning and Wendy Warren, Nurse Director, of Gwent Healthcare NHS Trust shared their experiences of the decision making process that will result in 100% single rooms for the pathfinder hospital developments in Gwent.

Moves towards a single room policy started two years ago when Alex heard Professor Ulrich speak on the benefits of single rooms at a London conference. It was seen as an opportunity not to be missed and they could not afford not to consider taking that option; a big decision to make, not just in terms of the potential financial implications, but also in the required cultural change. But in answer to the question ‘Why 100% single rooms?’ the answer was ‘Why not?’.

The process began by reviewing the available evidence and looking at actual examples, including both design and operational issues, followed by testing the views of patients, the public and, most importantly, the staff. As the consultations progressed the initial concerns changed to a generally favourable response to having 100% single rooms.

Board level support and commitment to the idea was vital because it was a policy decision that was planned to be taken forward throughout all the capital developments. Although there was no precise financial formula to show a cost benefit analysis, the research and evidence-based searching undertaken by the team made them confident that there were financial benefits in doing this even though there may be initial increases in capital costs. With the support of the Trust Design Champion, the Board accepted the arguments for 100% single rooms.

Having less than 100% single rooms was not an option, as single rooms are about a new way of working and a new model of care, much more than just a new way to organise the ward, and a half and half scenario would not help to achieve the necessary culture shift or changes in practice.

Having made the policy decision, the type of single rooms to use was the next issue. A number of options were considered and the three favoured designs were built as full-scale mock-ups. The evaluation process was led by the project clinicians; it was very important to make sure that the project was owned and endorsed by the clinical staff who will be going to work there. An evaluation questionnaire was produced followed by a stakeholder open week, when the public and other stakeholders came to view and rate each of the rooms, then an open week, for all clinical and non-clinical staff. The results
showed a resounding preference in favour of option A where the en-suite bathroom is embedded between the rooms, the version also favoured by the National Patient Safety Agency. That is the option now being pursued. The next phase in the decision making process is how these rooms are actually fitted out and where the fixtures and fittings are located.

Alex was followed by Wendy Warren presenting a passionate and ‘nurseist’ view of the issues surrounding single rooms and their impact on the delivery of care.

Wendy Warren

Wendy began by comparing the experience of being a hospital patient to that of a hotel guest. No one expects to book a hotel room and then have to share it with complete strangers, but that is what happens to hospital patients and at a particularly vulnerable time. Gwent has been offered the opportunity to move into an environment where patients can be offered a room which will provide them with a sense of dignity and privacy alongside all the positives clinical outcomes that are so important.

Single rooms will enable a move into a whole new way of caring for patients and enable them to have a much more dignified and private experience.

Gwent is collaborating with Cardiff and Vale NHS Trust in the Health Foundation’s Safer Patients Initiative looking at ways to improve patient safety and single rooms are contributing to this programme. There is a need to ensure that there are - No needless deaths; No needless pain and suffering; No unwanted waits; No helplessness; No waste.

...it was very important to make sure that the project was owned and endorsed by the clinical staff who will be going to work there.

The philosophy of care of the Gwent Clinical Futures model aims to provide care that is:

- World class
- Patient focused
- In the right place, at the right time, with the right person
- Seamless

WHE Internet website:  www.wales.nhs.uk/whe

Sketch design proposals for Ysbyty Ystrad Fawr; courtesy of Gwent Healthcare NHS Trust and HBG
Wendy then spoke from her experience as a nurse delivering care at the bedside and of the magical curtains which, the moment they were drawn, provided complete silence and privacy. As a student nurse she recalled giving a patient a bed bath while the consultant and his full team, bulging out from the curtain to the next patient’s area, explained to that patient that he had cancer: ‘The gentleman was slightly deaf, therefore we all spoke up slightly, but it’s OK because the curtain will block the message. What right do we have to expose individuals to that kind of private and sensitive information and lack of dignity?’. Single rooms will enable a move into a whole new way of caring for patients and enable them to have a much more dignified and private experience.

From a clinical perspective we need to think about what is good for clinicians, what is going to enhance delivery of care, what is going to move people through the system effectively, but we also need to think about the provision that we make for patients including aspects of cultural and religious practices.
There are also issues about socialisation although patients should not be in hospital for long periods and, if we get our pathways right, with delivering their care at the right time, there should be no need for these issues, some small rooms will be built for this. We need to think about taking services to the patient, rather than expect the patient to move, which will also contribute to infection control issues.

An important area is control of the environment and thinking about what the patient wants. Mr Jones is deaf, likes to watch his television with the volume full on. He shares his room with a very quiet individual who would like to listen to the radio or just have peace and quiet. If we have the opportunity to control our own environment it means that individuals need only consider themselves. Family, friends and carers can spend time with the individual and not interrupt and disturb anyone else.

Staffing levels are something that has been talked about a great deal. The initial anticipation was that we are going to need many more nurses. Here Wendy got onto her ‘nurseist’ hobby horse. Nurses talk about models of care, of which there are many forms. Single room provision provides an opportunity to take a step back from the way we deliver care now, to understand that we have got to change and to find the right model to enable us to deliver safe and patient focused care. As the years go by there can be a tendency to drift away from caring and move towards task orientation. This is an opportunity and a catalyst for change. Staffing levels mean that we can focus on the right areas, have the correct, appropriately trained individuals and deliver the care in the right place.

The aspects of cost cannot be ignored and are difficult to quantify but the intention is not to increase staffing levels, just to work differently. Staff in Gwent are not seeing that as a threat but as a really exciting challenge and are undertaking research into what is happening internationally. They are looking at ‘lean working’ and really focusing and streamlining what they are doing.

For Wendy, ‘Patients are what we are here for’. If what we do is not going to make a difference to them then we shouldn’t be doing it. One of her hopes in the new environment is to get rid of ‘nurses stations’, have a work station for data input but the nurses should be with the patients, all the care should be with the patients, doing the notes should be with the patients; hand over should be with the patients; nurses should be focused on the patients. The challenge is to make sure that the right model of care is in place when the new hospitals are built.

In conclusion, the challenges for the future include:

- Developing, communicating and implementing a new nursing (clinical) model
- Pressures to reduce size (and therefore cost)
- Building single rooms in larger hospitals
- Special areas – paediatrics and critical care
- Rethinking design at ward and hospital level to accommodate single rooms
- Preparing for new ways of working

But the opportunities offered include:

- Integrate with ‘lean’ work
- Productive Ward
- Greater patient focused, patient centred care
- Patient involvement
- Family involvement
Jonathan Millman, Head of Knowledge Management and Research within the Department of Health’s Estates & Facilities Division, brought delegates up to date with the new Hillingdon Hospital single room pilot project. The research programme commenced in April 2007 and the results will be seen in the 1000 m² single storey, modular building, adjacent to the hospital’s existing maternity unit, scheduled to be opened by summer 2008. The building will provide the NHS with a unique opportunity to evaluate the performance of a 100% single room facility in full use.

Statistics in England show that two or three years ago single rooms accounted for less than 20% of the beds across the entire estate. Therefore the question we should all be asking ourselves is “why are so few people actually going for 100% single rooms?” In answer to that question Jonathan showed a slide of an existing single bed room with no en-suite facility, very depressing, “the kind of place you’re put in to die”. In the 21st century, however, things are different: a single room is a patient’s own room, it is their personal space, it is more light and airy, it has its own sanitary facilities and provides a safe healing environment.

It is important, therefore, that as we talk about single rooms, we are aware of people’s perceptions. The Hillingdon project is partly about correcting those perceptions.

The pilot has four main aims:

- It will enable the Hillingdon Hospital NHS Trust to make informed decisions on single room provision in the future;
- It will provide evidence to support the Department of Health’s guidance on single room accommodation;
- It will feed into the HBN 04 update on Acute Wards and
- It will offer learning that will be transferable to the wider NHS and the UK as a whole.

Jonathan stressed that “The important aspect of this project is that Hillingdon Hospital is redefining its model of care to centre-around patients in single rooms. In other words, you can’t change the bricks and mortar if there’s a mismatch between that and the way you are delivering care”.

The design of the single en-suite rooms selected for the pilot project was informed by research previously undertaken by the Department of Health, which specifically looked at ergonomic aspects of a single en-suite room. As part of that exercise, mock-ups were built, incorporating movable walls for people to experiment with. Feedback was provided by a wide cross section of people.
include the impact on access, location of clinical support facilities within the room, staff observation from the corridor, visibility from the patient into the corridor, privacy, usable floor area and external views.

As with most designs, the layouts selected for the Hillingdon project were the result of compromises necessary in a real world. As Jonathan put it “You can’t get away from reality; we are not looking for Utopia”. He used a number of slides to illustrate the project, which has been designed around three wings, each incorporating a different 8-bed cluster, with a support zone in the centre. The layout of each cluster is largely determined by the en-suite facilities which are located either internally, in between the single rooms or on the external wall. The central support zone includes a small social space. Clearly the design of the central support zone would need to be adapted to individual ward configurations.

The important aspect of this project is that Hillingdon Hospital is redefining its model of care to centre-around patients in single rooms.

It is important, therefore, that as we talk about single rooms, we are aware of people’s perceptions. The Hillingdon project is partly about correcting those perceptions.

Each 8-bed cluster has its own merits and drawbacks. One, for example, includes same handed rooms, thus inserting a further safety aspect into the design. Some layouts provide greater scope for taking advantage of external views while others offer greater flexibility in the use of floor space.

In concluding his presentation, Jonathan was hopeful that the Hillingdon pilot project would provide a lot of scope for evaluating the performance of single rooms within different cluster configurations, covering the key areas of patient preferences, clinical outcomes and resource implications.
A double act of David Hastie, Deputy Director, Scottish Government and Dr Imelda Hametz, Senior Research Officer Health and Wellbeing, Scottish Government Social Research, presented Developments in Scotland, outlining their continuing research into single room provision.

For the benefit of delegates who, like him, might have been wondering what a symposium is, David provided four definitions he had found in a 1934 dictionary:

1. A drinking together
2. A merry feast
3. A banquet with philosophic discussion - ‘which explains why I am here’
4. A meeting to discuss a chosen or specific topic – ‘For that intellectual contribution Imelda was asked to come along!’

He began by stating his aim of providing a flavour of as yet unpublished work being done in Scotland to try and establish a policy on single rooms or indeed to discover whether such a policy is needed.

Their review arose from the European Health Property Network (EHPN) report ‘Hospital ward configuration - Determinants Influencing Single Room Provision’ published in November 2004 (downloadable from http://www.pcpd.scot.nhs.uk/developing.htm). A peer review consisting of members of the Scottish Government, NHS Scotland, infection control specialists, Directors of Finance, among others, was set up for the authors to present their findings and explain how they had approached the task. The review endorsed the findings of the Report but concluded that there was more work to be done, particularly to put it in a Scottish context, and a further expert group met in March 2006.

A census to discover the current single room position in Scotland was conducted and the not terribly impressive conclusion was that it is something less than 30%, although one hospital, purchased a few years ago, has 98% provision of single bed ward accommodation. A snapshot of projects currently at business case stage or under construction produced a slightly better picture, up to 52%, so things are moving in the right direction. This was not surprising given that people from the service who were delivering projects were going back to the centre seeking clarification on the appropriate percentage. The centre, at the time, was endorsing the EHPN principle of 50% to 100% single room provision but it was clear that the tendency of the service was to gravitate to the lower end of that range.

David then handed over to Imelda who, having listened to the morning’s presentations, commented that there were ‘some really interesting common themes’. She also noted that one work stream had “come up with something slightly different” which delegates might have found interesting, although this work had not yet been published.

Public attitudes to single rooms

There is a big debate in Scotland about the media and how much that influences how people think about services as much of the news reflects policy in London but not the fact that health is devolved in Scotland.

Accordingly, a survey was conducted to explore the public’s knowledge and attitudes towards single room accommodation and, in particular, assess their accommodation preference and discover their opinions on which different groups should be in particular types of accommodation. The benefits and risks associated with being in different types of accommodation were also examined, as well as awareness of current hospital accommodation. In addition, the survey identified whether respondents were hospital staff or worked in the NHS, to discover whether this would affect some of the answers.

At the end of 2006, 990 adults were interviewed across 43 sampling points and then weighted to ensure that it was representative of the Scottish population with all interviews being conducted on a one-to-one basis in the home and not by telephone.

What was discovered was that:

- Most people had relatively recent experience of hospital accommodation, either as a patient or as a visitor, that informed their responses;
- Respondents were aware of different types of hospital accommodation, with the largest proportion having experience of smaller multi-bedded ward accommodation.
Correspondingly, the majority thought that this was the most common type of accommodation followed by larger multi-bedded wards and single rooms.

The conclusions drawn were that:

- Respondents most commonly expressed a preference to stay in single room accommodation, though this was less than 50% of the total;
- Multi-bedded ward accommodation of up to six people was the next most preferred option with very few people expressing a preference for a larger ward;
- The most common reason for wishing to stay in a single room was privacy and all the issues discussed at the symposium;
- The most common reason for wishing to stay in a multi-bedded ward was having company or someone to talk to.

The research suggests that people’s response concerning their preferences for single or multi-bedded rooms is affected by what they normally experience at home. This was reflected in the responses which varied from “there is something about it being quite scary to be in a room on my own suddenly, because when I am at home I am with my family” to “I live at home alone and I don’t want to be with other people, I want to be alone when I am in hospital”. It is clear from the research carried out to date that the issue of preference for single rooms is very complicated and the results depend on “who you are, why you are in hospital, how long you are in, what age you are and what condition you have; all sorts of issues come into play”. More work needs to be carried out in this area.

Concerning the advantages of single rooms, Imelda confirmed that, with the exception of the public’s preferences, there was complete agreement with the other symposium speakers on other issues such as infection control.

Other work carried by the Scottish Government Social Research team has focused on the cost implications of single rooms and the impact on staffing levels. The results are summarised below.

**Cost implications of single room provision**

The range of work undertaken on costs for single bed rooms indicates that there are relatively modest increases in the costs but these are not of as much of a concern as one might think.

- Based on preliminary studies the cost impact of increased provision of single rooms is estimated at:
  - an increase in capital costs of up to 3%; and
  - an increase in operational costs of up to 2.5% (this excludes any cost from increased staffing requirements)

Experience suggests increased provision of single rooms will enable an increase of up to 10% in patient throughput.

**Nursing and workforce planning**

Whilst there is a general perception that more staff are needed to staff wards designed around single rooms, experience in Scotland, based on the Golden Jubilee National Hospital, near Glasgow, which provides a model of care based on 98% single bed room accommodation, demonstrates otherwise. This result, however, comes with a caveat: where staffing levels are already lower than optimal, single rooms may exacerbate the problems experienced.

Imelda concluded by likening the research to “the ends of the bed that supports the patients”. On one end is safety but on the other is patient centeredness and sometimes what is right for the internal feelings of the patients doesn’t match the safety aspects. And it is getting the balance and the bed to support the patient on both these issues that Scotland is beginning to think about.

**In summary…**

David ended their presentation by highlighting work at the Golden Jubilee National Hospital which has a very high rating of patient satisfaction and was rather at odds with the public attitudes survey. This has caused confusion as to where Scotland is going to just now; it is very much work in progress.

Like Wales, Scotland is going through a huge capital investment programme and the facilities being put in place are going to be there for a long time. As David put it, “we have to proceed perhaps with a bit of caution to make sure that whatever we put in place is the right solution for us”. There is a need for more full evaluations of projects in order to build up the evidence base, address issues around affordability and inform the way forward.

**The range of work undertaken on costs for single bed rooms indicates that there are relatively modest increases in the costs but these are not of as much of a concern as one might think.**

A project to develop a risk tool matrix which will help those who are developing facilities decide what level of provision is appropriate in their own particular circumstances is underway and once completed Scotland will be sharing that with the UK.
Dr Bernard Place  
Pembury PFI Hospital: Single beds - the decision making process  

Bernard Place, as Director of Nursing and Patient Services had been on the Maidstone & Tunbridge Wells NHS Trust board for nearly seven years. He began by stating that “it is crucial, if we are going to progress schemes with 100% single rooms, that we understand how boards need to make decisions. So I am going to present a view as a jobbing director”.

He continued by drawing a distinction between affordability and value for money, a point he was keen to pursue in more detail later in the presentation. “The two are different things and the board needs to understand the difference”.

The new hospital

In setting the scene for the new hospital Bernard stressed that single rooms were not the answer to the issues that had been discussed during the Symposium, they were an enabler, not a solution.

The new Pembury PFI Hospital, scheduled to open towards the end of 2010, will have 512 single rooms with en-suite bathrooms. The rooms are 16.3 m², the bathrooms 4.5 m², giving a total area of approximately 20 m². In England PFI schemes have to apply a criterion called 15% metric: if the Unitary Payment exceeds 15% of the normalised income, i.e. turnover net of any one-off non-recurrent amounts, then the scheme does not proceed. This is new in England and acts as a discipline, both for the PFI consortia and for the Trusts.

Bernard stressed that the full benefits of 100% single room provision can only be realised if the design of the whole hospital is based on a patient safety approach.

...the full benefits of 100% single room provision can only be realised if the design of the whole hospital is based on a patient safety approach.

The Trust collected the available evidence together, ranked it with the clinical staff and the patients PPI Forum and drew up a long list of requirements, with patient safety at the heart of the project. The Trust then presented it to the competing PFI consortia and asked them to “get down the list as far as you can”. Interestingly, the debates about affordability suddenly started to become much more focused and detailed.

Pembury Hospital single room design proposals, courtesy of Laing O'Rourke
more manageable because both consortia competed with each other to include as many of the listed items as possible.

**How do Trust boards make decisions?**

Boards are interested in economics and in financial balance. The rule of thumb is that every £10m of capital creates the need for revenue of £1m for the Unitary Payment. Boards therefore need to take a very hard headed view about the business case for patient safety and if the spend on a hospital is going to be £5-10m more to make it safer, this has to be offset by consequent revenue savings that result from that improved safety.

In the case of the Pembury Hospital project, the Board decided that they would not focus on patient safety “just because it was the right thing to do”. They did it because it was a business imperative, a belief that the safest businesses are the best businesses. Patient safety has not been included in the past as a core requirement although there has been much talk about it.

**Basic economics of patient safety:**

- **PFI Rule of Thumb** - “Every £10m capital investment generates a revenue cost (an "availability charge") of £1.0m
- **Capital investment in patient safety needs to be more than offset by revenue savings**
- **Revenue savings need to be "cash releasing" i.e. they support a reduction in operating costs sufficient to enable the servicing of the additional cost of capital investment in patient safety.**
- **Patient safety has to be important enough for stakeholder to generate a "willingness to pay" or a "positive consumer preference"**

Typically, boards make decisions on the basis of a 5-10 year horizon. In reality, hospitals built today will have to last 60 years and it is easy to build them on today’s problems and not look sufficiently to the future. For example, the decision to provide 100% single rooms in Pembury was partly informed by the reality that people’s tolerance of communal living is changing and will become increasingly important in future.

Trust boards make decisions on the basis of policy context. Currently, patient choice is a major issue and the likelihood is that safety will play an increasingly important part in patients’ selection of where they wish to be treated. Also, on the issue of patient choice, whether patients choose communal care or single rooms can depend on their experience. If you ask a patient in a multi-bedded bay who is on a commode, with diarrhoea, what they prefer, their embarrassment will tell you. Experience informs the choices people make.

The way a board addresses the potential conflict between the pressures of consumerism and affordability was illustrated by “a fundamental mistake” the Board made at the start of the procurement process. Initially the PFI consortia were asked to meet the NHS guidance for 50% single rooms. When asked to give variant bids above 50% to show what they could do, not surprisingly all efforts were focussed on making a compliant bid at 50% with very little effort on anything else. As the scheme proceeded they were asked to submit bids based on 100% single bed provision, with variations below that. As Bernard put it “surprise, surprise, we got two affordable compliant bids at 100%”. So, the message is: “Act as an informed client in the process and, as a board, have the courage to set out that informed view”.

Boards also take into account the local context. Tunbridge Wells is not typical as the local population has high access to the independent sector and experience of single rooms. As waiting times fall to 18 weeks, the Trust board is certain they will see a move from the independent sector into the NHS and have modelled that very prudently into their business case. In addition, the current hospital fabric is poor, it is falling down. In fact, until last year they were using huts which were built for Canadian war wounded in 1942, so patients were receptive to a radical solution.

Bernard would like to have said that the choices the Board made were rational business ones and were about the evidence presented. “Unfortunately, life isn’t that simple”. In reality, the success of the project was due, in part, to circumstances:

- **Having the right personnel at the right time;**
- **The increasing importance of infection control driving change;**
- **Changes in patient safety culture;**
- **Changes in building techniques that have permitted significant per-fabrication off-site, made possible by the repetitive detailing of 512 single rooms and resulting in construction cost savings; and**
- **Two PFI consortia very receptive to ideas, driving a lot of the changes.**

**Summing up**

In summing up Bernard did not think there were now any issues about affordability and, increasingly, about the evidence. The issue for Pembury, rather, is about “how we take patients and the public with us”. The real challenge is about how to change the way the hospital works, to remove central nursing stations and introduce set down points. “The director of nursing that leads that change will be the devil’s spawn”.

For Maidstone & Tunbridge Wells NHS Trust there is no turning back, they have made their decision and they have to make it work. It has been a long, hard slog.
Roger Ulrich began his second presentation of the day with a look into the future, confirming that healthcare is notorious for its rapid changes. Assuming that nearly everyone has new hospitals with 100% single rooms, how are they going to perform in 5 or 10 years? Are the hospitals being built today going to hold us in good stead in terms of future proofing? Are single rooms going to help or hinder with the problem of adapting to change?

It is a time of enormous investment internationally in new healthcare buildings that will last, even with pessimistic projections about economics, for many years to come. It is a good time to be in healthcare and it is important to get things right.

**Trends for the future**

**Acuity**

Worldwide there is a relentless increase in acuity for in-patients which is now also being seen in out patients, as well as people cared for at home:

- Hospital patients will be sicker, more vulnerable and immuno-compromised
- Chronic illness patients in the community will also be sicker and more vulnerable
- MRSA, C. difficile and other infections will be widespread in the community and routinely brought into hospitals

Patients in hospital are sicker than they were. People who not very long ago would have been in intensive care are now in general medical wards and intensive care units are full of patients who would not have been alive 10 years ago. The increase in acuity is not simply due to the ageing of the population but the increasing advances in medical science are wonderfully adept at generating a constant onslaught of new categories of very high acuity patients. When people are sicker, are longer in community-based care and on long courses of antibiotics, there is going to be a growth in community-based antibiotic resistant strains. The standards in the environments we have been able to successfully provide in the past in dealing with infection are going to have to improve. More clean air and single rooms are a large part of this.

**Safety**

Hospitals in the future have to be designed with errors and safety problems in mind as these are becoming ever more costly with more and more litigation based around patient safety. In the USA draconian financial pressures are being put upon healthcare providers to become safe and specifically to reduce infections. People can litigate successfully on infection, not just falls, and this is also rapidly changing the business case. It certainly gets your attention from the stand point of the way hospitals are designed and the care processes organised.

Sicker patients will mean single rooms with staff located nearby. It will mean thinking about general medical surgical as having the capability to adapt to patients that today are at the acuity level of the intensive care unit.

A very large proportion of preventable deaths in American hospitals occur shortly after transport from intensive care units to general medical surgical units. The patient is doing fine, they stabilise, they are transported safely but, even in a single room, if the equipment is not there and the staff are not there with the skills and something goes wrong, the outcome can be fatal. As a result, general medical surgical single bed rooms are being equipped to higher levels of acuity.

**Well-designed patient rooms and supply locations reduce staff walking and increase the time nurses have for direct care activities.**

**Staffing levels and family care**

There will need to be more family involvement in care. We are running out of healthcare workers, particularly nurses, partly because healthcare systems in some of the traditional exporting nations are now doing a much better job retaining their nurses and building their own healthcare systems. We also have more patients than ever before, with an ageing population and will probably see tendencies towards lower nursing ratios in the future, forced by this situation. So, for this reason alone, there has to be more family involvement in care. Where this happens, in the example given of a paediatric unit, the parents liked it, the staffing level for the unit was lower, the outcomes were good, it was very cost effective and satisfaction was high. Staff also need to be supported and taken care of to ensure their efficiency and retention.

Single room layouts, including higher equipment capabilities and decentralised nursing and observation stations, are increasingly appearing in lower acuity spaces, such as general medical and outpatient surgeries. Providing single rooms is vital for adapting to sicker patients in future.

**Cleaning**

The effectiveness of traditional cleaning methods in contributing to the battle against infection is now being questioned. Studies have shown that even if the areas were clean, the traditional cleaning procedures were not doing a good enough job and other technologies are now being tested. One such technology is hydrogen peroxide vaporisation which is excellent in creating a sterile environment and does not leave a toxic residue.
Unfortunately the costs are high and the time taken is long, up to four hours, as the area to be cleaned has to be sealed and ventilation shut down. It is not suitable for multi-bed wards. In Scandinavia they have been using this system for some time and design their single bed rooms for hydrogen peroxide vapourisation with localised ventilation control. They are aiming to reduce the turnaround time to under an hour with virtual complete sterility and have been able to largely eradicate infections and antibiotic resistant strains from within their hospitals. But without single bed rooms it is not even possible to consider this or other new methods of decontamination.

Emerging technologies

Other emerging technologies that are important for safety include pendant power columns which provide greater flexibility and acuity adaptability and with emerging evidence that indicates better patient outcomes. However, they do require different room dimensions as they need a higher ceiling or change in ceiling configuration. Another major drawback has been that they used to be a lot more expensive, although that is now changing.

Localised supplies

Well-designed patient rooms and supply locations reduce staff walking and increase the time nurses have for direct care activities. In the example shown by Professor Ulrich, a central supplies store on a 32 single bed room unit, with each nurse responsible for 4 patients, was decentralised to four stores. The result was that the travel time for nurses was reduced from 6.0 km per day to 2.9 km per day. Care time increased and staff spent less time ‘hunting and gathering’ supplies. An analogy is with a young couple returning home with their first child. Do they store the nappies in the nursery, close to where they are needed or in a neighbour’s garage down the road?

In some designs, supplies are localised between one or two nurses with both clean and soiled storage. Staff request supplies and medication electronically and they are delivered on a ‘just in time’ basis by a supplies person with a separate person removing the soiled supplies.

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The effects on nurse activity in traditional versus well-designed floors with decentralised supplies is:

<table>
<thead>
<tr>
<th></th>
<th>Traditional</th>
<th>Well-designed</th>
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</thead>
<tbody>
<tr>
<td>Travel</td>
<td>10-15 km</td>
<td>2-5 km</td>
</tr>
<tr>
<td>Care time received by each patient</td>
<td>16-24 minutes</td>
<td>35-45 minutes</td>
</tr>
</tbody>
</table>

Time spent ‘hunting and gathering’

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<tbody>
<tr>
<td>Traditional</td>
<td>40%</td>
</tr>
<tr>
<td>Well-designed</td>
<td>10-15%</td>
</tr>
</tbody>
</table>

Same handed rooms

Same handed single bed rooms, in theory, ought to reduce errors, although that has not yet been proved in well controlled studies.

A number of examples were illustrated, which showed all the benefits of single rooms previously discussed including localised nursing stations, direct sight lines, optimally placed sinks, assisted journeys to the bathroom to reduce falls and provision for family presence.

Also shown was the use of motion detectors that are simple and inexpensive and can be calibrated for the patient so, if the patient stirs at night, staff are alerted and can attend speedily. However, the real safety benefits of this system have yet to be researched.

Evidence-based design to improve financial performance

Well informed leaders are an important element in the planning process and those with operational experience are even more vital as, generally, responsibilities for capital investment and operations are largely separated and evidence-based design relies on operation input. In countries where patient choice operates and revenue follows the patient, the single bed room option is preferred.

Evidence shows that building cheaply and quickly has negative long term consequences in healthcare, operations and revenues, but building based on evidence and spending only slightly more, has positive consequences in these areas.

In addition, the U.S. Military Health Service, an organisation much criticised for its care and not known for its innovation, is adopting an evidence-based design approach for all their new buildings. “A growing body of research has demonstrated that the built environment can positively influence health outcomes, patient safety and long-term operating efficiencies to include reduction in staff injuries, reduction in nosocomial infection rates, patient falls and reduction in the length of hospital stay”.

Roger closed his presentation with “a few personal suggestions, for Wales to consider to make sure this so important procurement programme is just wonderfully successful”:

- Become informed clients;
- Create superb briefs;
- Integrate thinking about initial capital cost and the long term operations perspective;
- Accept that the procurement of good buildings means spending slightly more on initial capital cost;
- Consider rewarding administrators who are creating good buildings. The leadership has to involve everybody but it has to have on-going, passionate, knowledgeable involvement and commitment from the top.
Matthew Bending, who has a Masters of Science in Economics, presented a report at the half-way stage of a two-year study for the Patient Safety Research Programme into the Cost Effectiveness of Hospital Design being conducted by the York Health Economics Consortium at The University of York.

The presentation was intended to provide an academic perspective on the subject of single rooms, and give delegates an insight into the preliminary results of the work undertaken to date. The timing of the Symposium, however, prevented Matthew from disclosing the results. He therefore focused his presentation on the challenges facing the research team in attempting to measure, in monetary terms, the health benefits of different design solutions.

The concept of measuring health benefits in monetary terms is, as Matthew put it, “distasteful” to many non-economists and, in general, health economics has gone down the route of measuring benefits in other ways. As the research team has found, the measurement of health benefits in financial terms is very difficult and further work is required before the results of the study can be revealed.

The research programme focuses on design solutions relating to single rooms, operating theatres, slips, trips and falls, ventilation and ward layouts.

Within each area, a number of outcomes have been identified which the team will attempt to value in monetary terms. In the case of single rooms, the impact of designs has been restricted to five outcomes: infection rates; length of stay; adverse events; medication errors and patient satisfaction.

The team has found that applying such values to patient satisfaction is proving particularly challenging.

A literature review of studies undertaken by the team into the impact of the introduction of single rooms on the above mentioned outcomes has highlighted mixed results:

- Infection rates: there is evidence that there is a reduction in infection rates;
- Length of stay: the evidence is unclear because of the difficulties of separating the impact of single rooms from the design of wards which the studies focused on;
- Adverse incidents: evidence could not be found that directly relates the before and after effects of the introduction of single rooms;
- Medication errors: the evidence points to a reduction in medication errors;
- Patient satisfaction: The evidence points overwhelmingly to an increase in patient satisfaction, although this varied with length of stay and the type of ward.

Matthew pointed out, however, that most of the research reviewed by the team related to intensive care units. There are few studies on general medical wards that fit the criteria of this particular project. Further challenges concern the disentanglement of cause and effect. For example, in identifying the reason for a reduction in infection rates, it is important to establish the impact of ventilation as opposed to the provision of single rooms.

The presentation touched upon different types of designs: there are those described as “dominant economic designs” which deliver benefits at no or reduced costs. Others deliver benefits at an additional cost and these require a cost index in order to rank the designs. In order to quantify the benefits in monetary terms the research team is looking at two approaches: the “cost consequence analysis approach” and the “cost benefit analysis approach”. In order to get a true picture of the cost of the benefits of different designs, it is also necessary to take into account the cost of less obvious factors such as training and cultural changes required in order to get the best outcomes. Furthermore, account needs to be taken of the cost of implementing designs.

When it comes to measuring the cost of non-health benefits, however, the challenges become even greater. How does one measure, in monetary terms, the benefits of privacy, comfort or the feeling of being at home in a single room? In such situations the team will be using the “willingness to pay methodology”, commonly used in safety, transport and environmental economics. This requires questionnaire respondents to reveal the maximum amount they are willing to pay for a particular benefit.

Next steps

The next steps in the project are:
- Completion of systematic literature review
- Currently in the process of framing the willingness to pay questions
- Recruitment of stakeholders
- Estimation of the benefits of the design options
- Identifying the cost-effective design interventions
- Implementability case studies

Matthew and the York team aim to present their findings in the autumn of 2007.