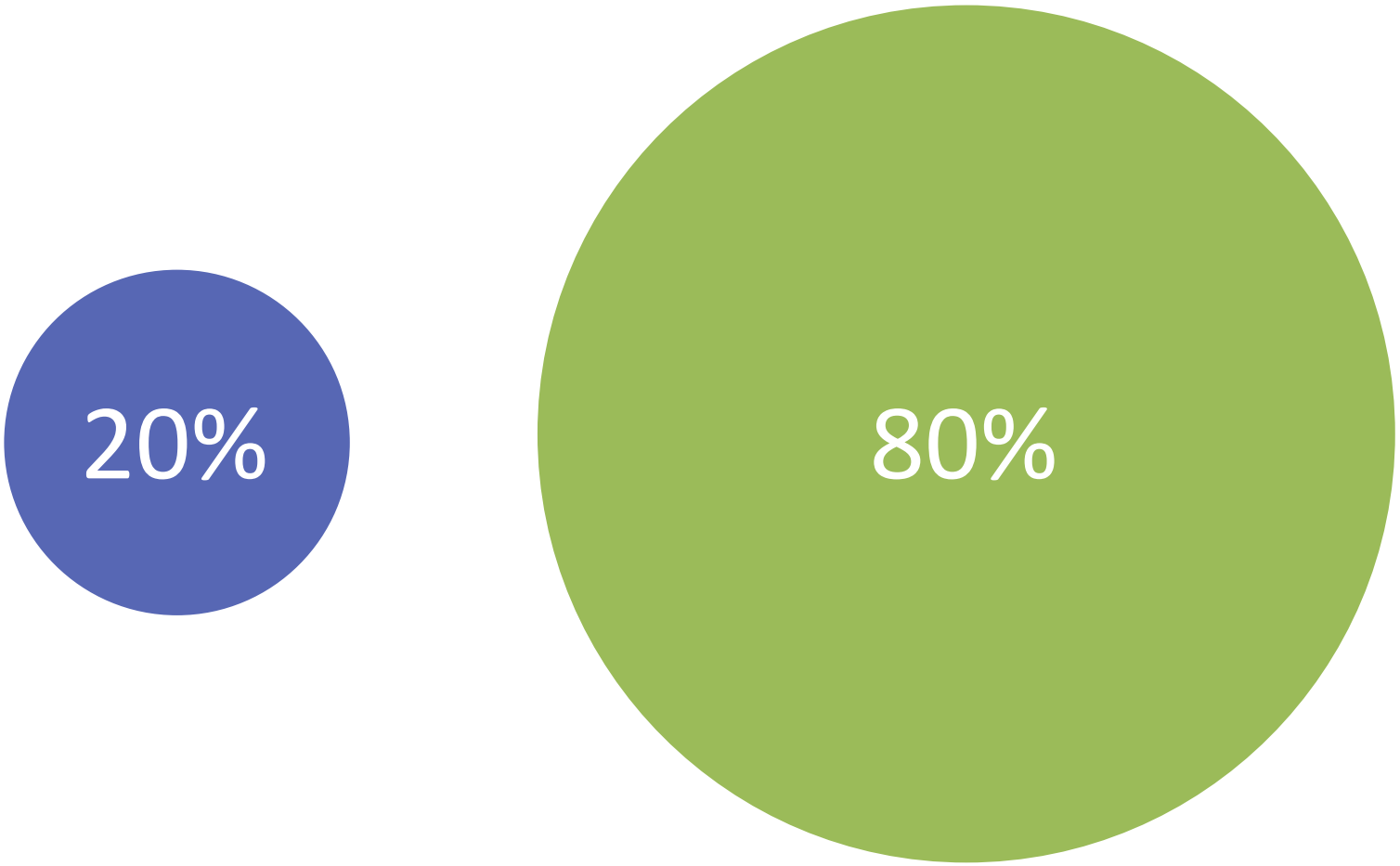
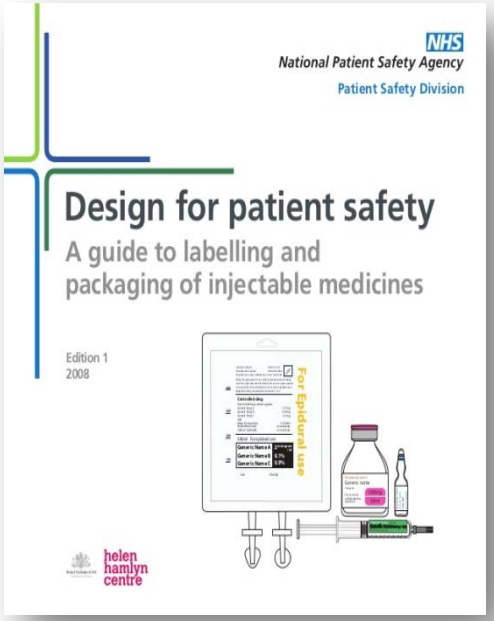
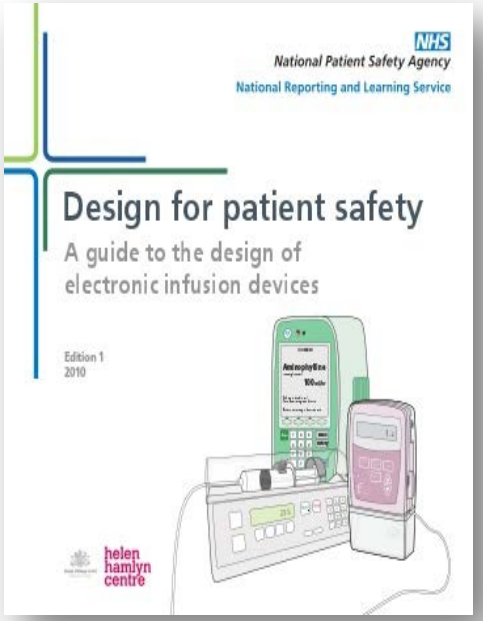
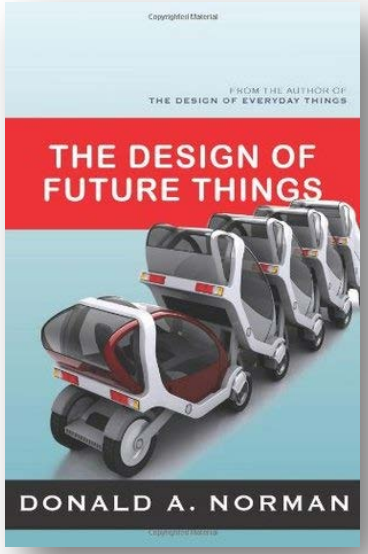
Using Design for Patient Safety

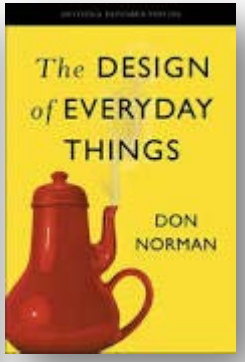
80% of the impact is determined in the design stage

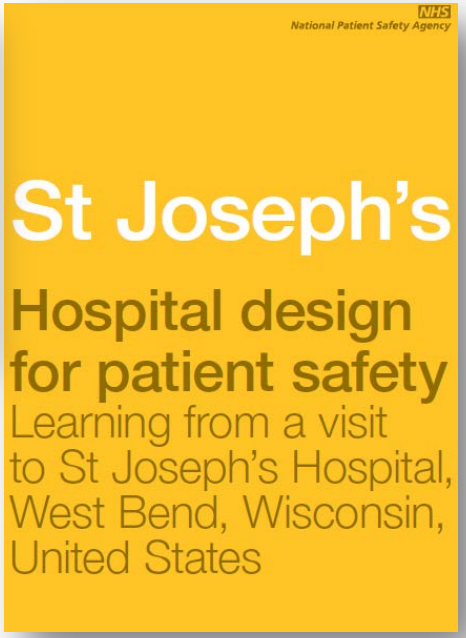












[Collection of design guides]

Don Norman

- The Design of Future Things
  - https://www.youtube.com/watch?v=wQmwEjL6K1U
- Design of Everyday Things
  - https://vimeo.com/80211198

Articulate the design principles for all to agree

- Design using FMEA (failure modes and effects analysis) at every stage
- Standardise location of equipment, supplies, room layout
- Involve patients and families in the design process
- Design to bring critical information for decision making closest to the patient
- Reduce noise

Design around latent conditions

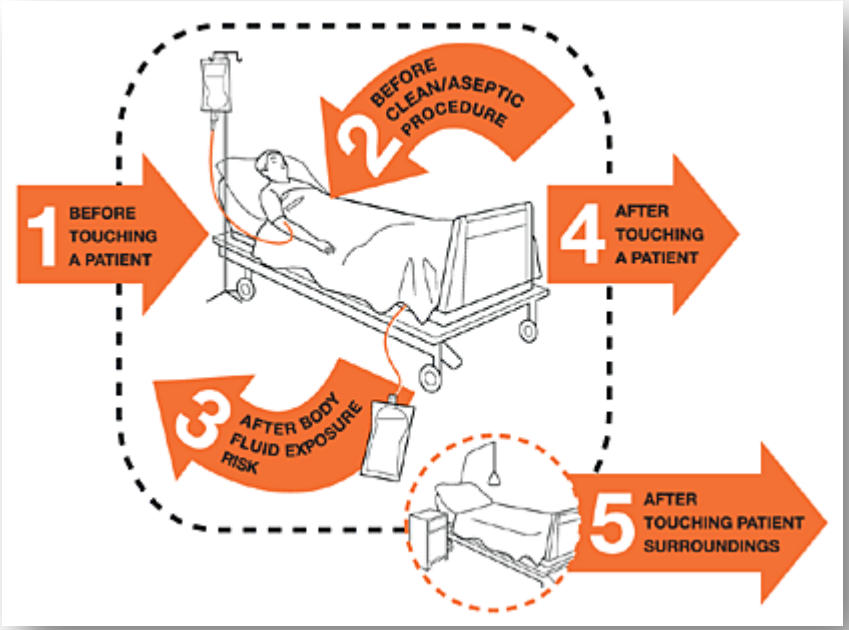
- Noise reduction
- Visibility of patients to staff
- Standardisation
- Automate where possible
- Minimise fatigue
- Immediate accessibility of information, close to the point of service

Design to reduce active failures

- Operative/post-op complications
- Potential or actual infections
- Events relating to medication errors
- Deaths of patients in restraints
- Inpatient suicides
- Transfusion related events
- Correct tube-correct connector-correct route
- Patient falls
- MRI hazards

Hand hygiene

- Strategic placement of gel dispensers by the head of the patient bed to increase hand-washing compliance

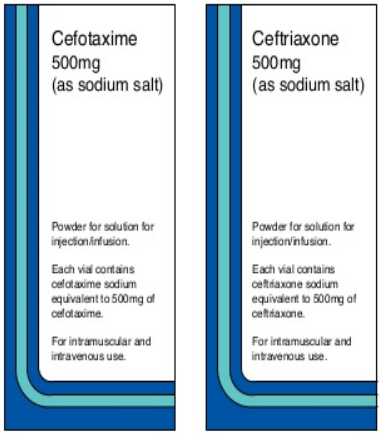


Medication packaging and labelling

1.3 Similar drug names

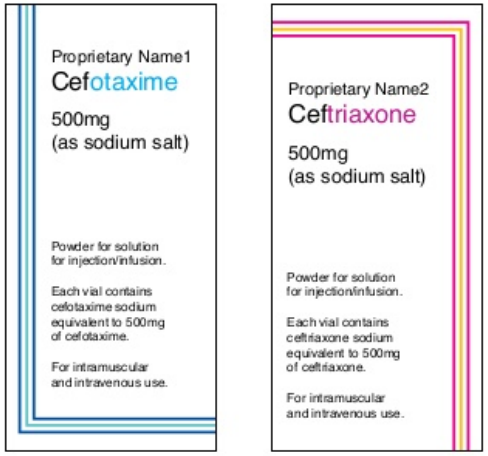
Issue

- Similar names can be easily mistaken for each other, especially with smaller labels which require small font sizes.



Recommendations

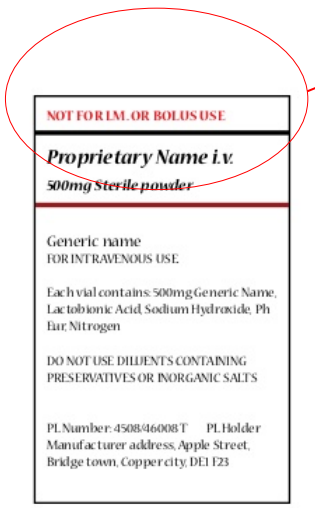
- Highlight the differences between the generic drug names. This could be done through the use of colour, tallman lettering or font sizes.[10]
- Change the graphic component to ensure an added element of differentiation.



1.6 Administration route

Issue

- Routes which should not be used are stated rather than routes that should.



NOT FOR....

Recommendations

- Make positive statements – use 'do's', rather than 'do not's'.
- Use specific directions and avoid using technical terms that are not well understood, e.g. 'For Parenteral Use' meaning 'For Injection or Infusion'.

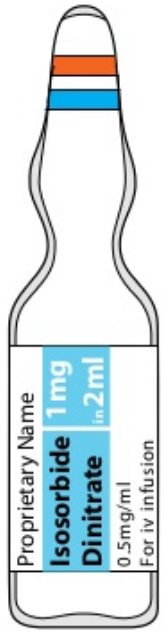
2.1 Text orientation

Issues

- When the medicine name is printed horizontally around the vial or ampoule, similar names can be more easily confused with one another.
- This is particularly important for the smaller ampoules of 1, 2 and 5ml.

Recommendations

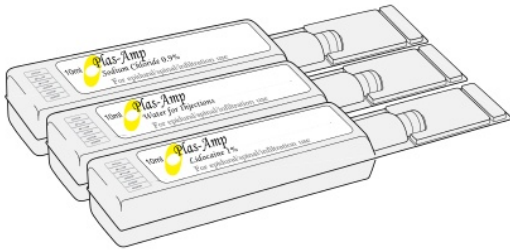
- Print the medicine name longitudinally, along the length of the ampoule.
- A good rule of thumb is: if the visible width of the label is less than the height of the label then the name should be printed longitudinally.
- The information that must be present on containers 10ml or smaller is:
  - Medicine name
  - Expression of strength (where relevant)
  - Route of administration
  - Posology (for self medication)
  - Warnings
  - Expiry date
  - Batch number
  - PL number
  - MA holder's name



2.3 Plastic ampoules

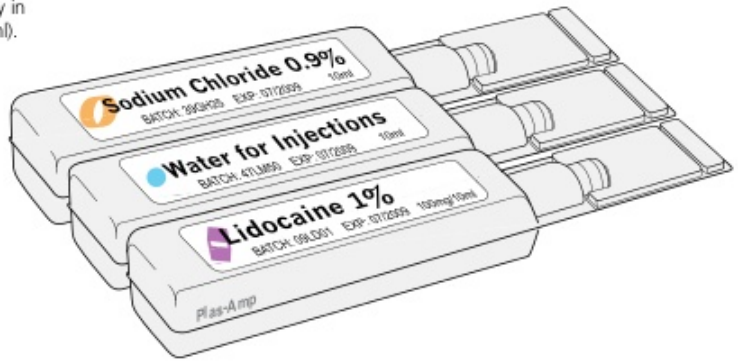
Issues

- Plastic ampoules may look very similar, with minimal differentiation between the labels.
- Confusion may occur because of the undue emphasis on the name of the container type.
- Expiry dates and batch numbers may be embossed, which are hard to read.



Recommendations

- Use a large, clear font.
- Use colour to help to differentiate between products.
- Eliminate or reduce emphasis on the name of the container type/ brand such as 'Plas-Amp'.
- Expiry dates and batch numbers should be easy-to-read and printed on the main body of the container, not on rip-off tabs.
- Where concentrations are shown, they should be expressed as total quantity in total volume (e.g. mg/10ml).



Noise

Noise

- Noise is a serious health hazard and a threat to safety and performance, it:
  - Interferes with communication and memory
  - Creates distractions
  - Affects cognitive performance and concentration
  - Causes annoyance
  - Contributes to stress and fatigue
  - Has been found to negatively affect the quality of the healing environment for patients
  - May elevate blood pressure, increase pain, alter quality of sleep, and reduce overall perceived patient satisfaction

Noise and speech

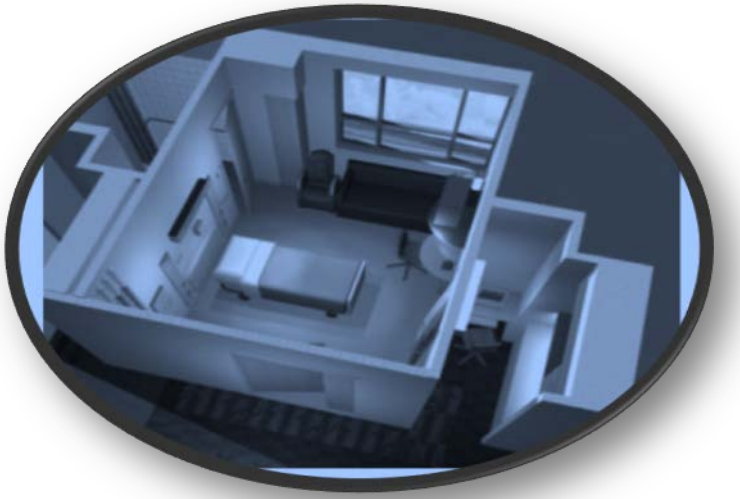
- When the reverberation rate is long, there is greater opportunity for sounds to blend together, increasing the noise level

- A longer reverberation time combined with background noise makes speech perception increasingly difficult

Design features used to reduce noise

- Stronger steel designed to reduce vibrations
- Carpeting or noise absorbent floors
- Standardised single rooms with insulation between rooms
- Noise absorbent ceiling tiles
- Quiet-engineered mechanical systems
- Quiet-engineered equipment and technology
- Elimination of alarms

Single rooms



Design principles for single rooms

- Allow space for staff to provide care and for family members who want to stay close to the patient
- Provide a small ‘charting’ alcove adjacent to the room to allow nurses to observe without disturbing the patient's rest
- Windows to all patient rooms need to be oversized, improving visibility of patients while enhancing their view of natural surroundings
- Light sources within rooms mimic natural light, yet allow for appropriate viewing of patients

Design principles for single rooms

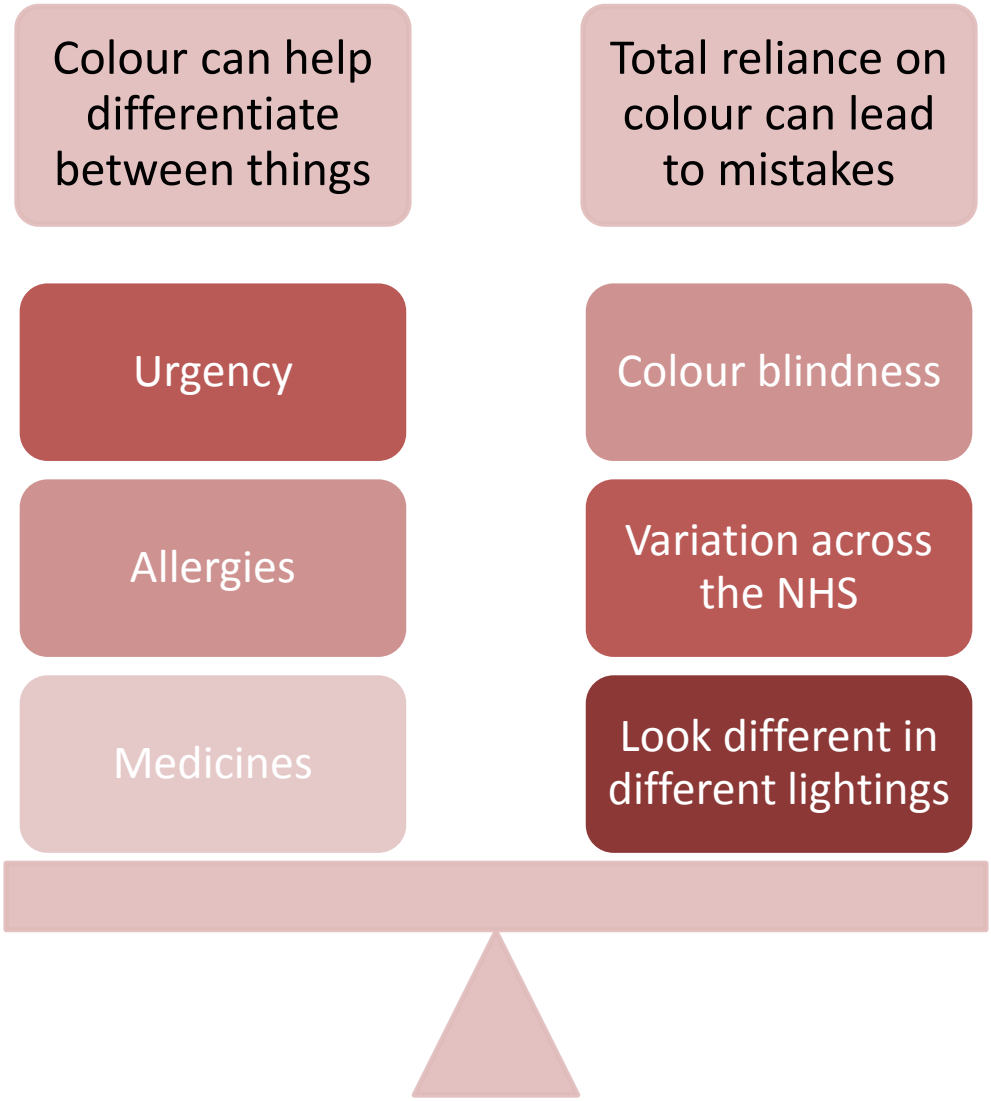
- All rooms standardised in layout and placement of equipment and supplies
- Use cabinets to hold the patient's barcoded medication—in a locked box—along with all other supplies needed for patient care
- Reduce foot flow and therefore the nurse's fatigue – increasing time spent with the patient
- Equipment for lifting patients in every room
- Automatic lights that go on when the patient attempts to get out of bed

Design principles for single rooms

- To reduce patient falls provide bathrooms at the head of the bed with a handrail from the bed to the bathroom
- Beds that lower to reduce the harm to patients falling and rubber flooring that is safer than traditional hard flooring alternatives
- A sink, in view of the patient and conveniently located for staff and family to reduce the risk of infection
- Standardised headwalls for gases, electric on both sides of the bed
- Heightened ceilings to allow for services—such as enhanced radiology procedures, endoscopy, or minor surgery—to be delivered in the patient room enhancing safety by reducing movement and handover

Colour

Use of colour



Colour of the walls

- Orange stimulates the appetite, blue supresses appetite - this has led to the creation of very specific colour schemes for dining rooms in mental health facilities treating people with anorexia

- Orange also stimulates mental activity, so is often avoided in mental health units treating those with more intense psychological conditions

- Patients at risk of low oxygen levels or cyanosis present with blue or purple skin colouration, reflection from yellow surfaces has been found to minimise observation of blue skin tone, while reflection from blue surfaces can unnaturally enhance cyanotic tone

Colour of the walls

- Yellow or blue surfaces can make observing babies with liver disease, who present with yellowing of the skin, more difficult

- Yellow, while associated with joy, happiness, intellect and energy, is also known to make babies cry more, so is often avoided in maternity and neonatal wards

- Red, while energetic and powerful, raises blood pressure, so would not be the best choice for a cardiac unit

- Public, patient accommodation and treatment rooms - a softer neutral colour should prevail

A place for everything 1/2

- In waiting rooms colour schemes should be uplifting and interesting
- Corridors and receptions can often be confusing, so to aid navigation and way finding, long corridors can be divided with strong accent colours, either for directional purposes or to identify different departments
- Areas behind reception desks, in particular should stand out
- Warmer palettes can then be used in public areas such as restaurants and cafes
- In patient rooms, interior design should be light and fresh
- Children's wards need to be interesting and vibrant using a simple combination of pure accents to create an impression of fun, and clear and unsophisticated colours to reduce anxiety and confusion
- Intensive care units should be calming and restful, with soft neutral tones

A place for everything 2/2

- Consultation rooms need warm neutral colours in the main, with accent colours only where visual diagnosis does not take place, such as behind desks

- Operating theatres need extra special consideration, with walls usually painted green or blue/green in colour. This is a very deliberate move to counteract the effect on the eye of prolonged staring at the deep red of open wounds. As green is the complimentary colour to red, it can neutralise the after image produced by the surgeon's concentration. A cooler, muted palette is recommended in these areas

- Colour contrast is vital in dementia care settings, where cognitive and perception problems can lead to falls and increased anxiety

- Research has shown that changing the colour of a toilet seat to a shade at least 30% different to the rest of the toilet means dementia sufferers can see where to sit, avoiding potential falls or spills

References

- King's Fund's *Enhancing the Healing Environment* programme:
  - Funded design changes to hospital dementia facilities
    - "It is about helping people to know where they are, helping them to find their bed area, and giving them something familiar to do or to look at. It's the little things that can make an enormous difference."
    - "A tin of coloured paint doesn't cost any more than a tin of traditional magnolia paint, but the effect it has is significant."

- *The Application of Color in Healthcare Settings* by Sheila J Bosch et al.

- Health in Wales's *Lighting and colour for hospital design* research and development report

Standardisation

Standardisation

- Standardisation could substantially reduce errors and improve quality, it:
  - Reduces reliance on short-term memory
  - Allows those unfamiliar with a given process or design to use it safely and efficiency
- Standardisation can apply to:
  - The facility and room design—from the location of the outlets, to bed controls, to the cupboards in which the latex gloves are stored
  - Equipment and technology e.g., intravenous infusion pumps, IVs, monitors, beds, medication and decision support systems, and the locations for all gases throughout the facility

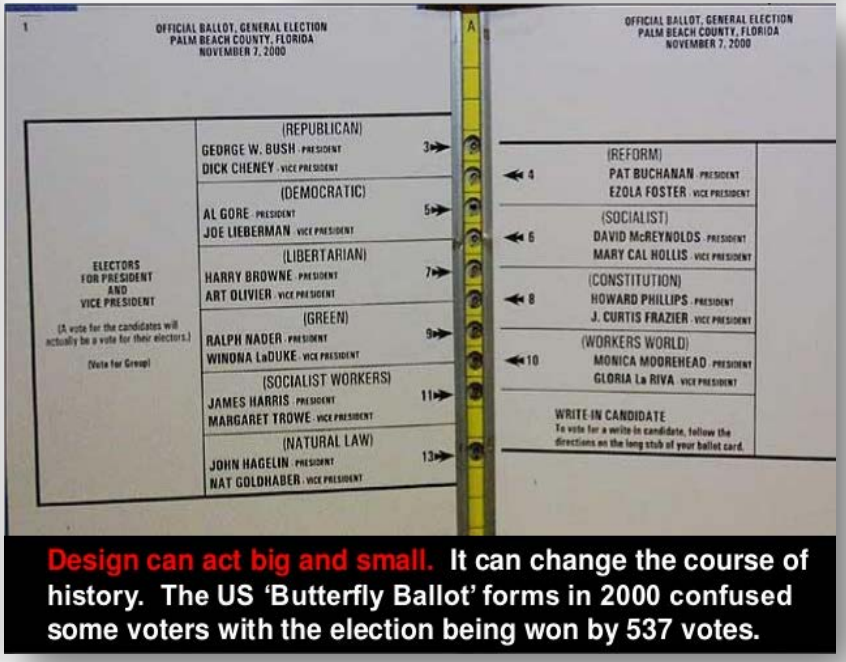
Benefits of implementing standardised protocols

- Standardisation
  - Provides policy and decision-makers, and health-care workers a means to compare actions and outcomes implemented within or between groups
  - Better enables investigators to compare data and to interpret the relevance and efficacy of an intervention
  - Helps health-care workers relate to one another in meaningful ways; as more and more hospitals begin to use the same protocols with the same data fields, the ability to share lessons will be enhanced

Cost

- Designing around patient safety will have a return on investment (ROI) for two significant reasons:
  - First, a patient safety designed hospital is more efficient, as a result of standardisation and automation
  - Second, designing for patient safety will help to eliminate near-miss incidents, errors, and patient safety incidents, reducing hospital stay lengths and readmissions from safety issues

#designfail



Design can act big and small. It can change the course of history. The US 'Butterfly Ballot' forms in 2000 confused some voters with the election being won by 537 votes.

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Using Design for Patient Safety
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