

## **Dr David Swann**

Output number: 1 of 2

Year of Output: 2013

Type of Output: Designed Product

Title of Output: 21<sup>st</sup> Century Nursing Bag

Location:

Support Materials:

- i. Publication of Creative Practice
- ii. Exhibition of Creative Practice
- iii. Design Innovation/ Enterprise Awards
- iv. Advocacy
- v. Intellectual Property arising from Creative Practice
- vi. Images
- vii. Media

### **Outline Description**

The principle aims and objectives of design research are to:

- study how planned treatments are delivered in patient's homes
- examine nursing bags used in practice: delivery, design, materials and cleanliness
- capture the professional challenges of nurses in greater detail
- to co-design a 21<sup>st</sup> century nursing bag that improves patient safety productivity and the patient's experience
- To validate the effectiveness of a proof of concept demonstrator

The black nursing bag, the indispensable transportation tool used by community nurses throughout the world has been impervious to design innovation for over 100 years and now considered to be dangerous and outdated: 21<sup>st</sup> century professionals using 19<sup>th</sup> century equipment. This 21<sup>st</sup> century nursing bag supports a paradigm shift in future home healthcare delivery and provides enhanced performances in patient safety, service quality and productivity. Specifically this bag design maximises patient/ clinician safety by enhancing the effectiveness of hand-decontamination techniques. This patent-pending bag design consists of the following innovative features:

- a hard-sided bag enabling effective hand decontamination
- an elevated integrated treatment space to separate clinical materials from patient's floors
- a modular delivery system: patient drawers or dedicated treatment packs
- a 'backless' bag aiding effective access for cleaning
- the removal of all protruding features that has the potential to harbour bacteria: shoulder straps, fasteners, piping, buckles and badging
- the novel use of gravity to retain drawers/ packs;
- one plastic moulding to eliminate traditional part jointing/ bacteria traps

- A white coloured bag that visually conveys its state of cleanliness to both the patients and healthcare workers thereby necessitating a frequent cleaning regime

## **Originality**

The exodus of hospital treatments into patient's homes is accelerating due to spiralling demand and costs with new intermediate care teams emerging to bridge the gap between acute and primary care. NHS East Riding of Yorkshire provides primary, secondary and community healthcare services to its 332,099 registered patients, of which, 30% are aged 60-90 years with 21% of this demographic reporting a long-term illness requiring managed care (NHS ERY, 2007). In 2008, NHS ERY introduced the first of its Neighbourhood Care Teams to enable patients with long-term illnesses to receive their frequent treatments from the comfort of their own home. NCTs now provide over 450,000 patient contacts each year.

Diary analysis revealed that a NCT nurse can potential visit up to 17 patients a day with wound care and catheterization dominating the treatment type delivered. Clinician's working in this uncontrolled healthcare setting requires new tools specifically designed to tackle the challenges/ risks posed by this environment. Added to this, Dancer (2007) voiced concerns regarding the acquisition of hospital-acquired infections that inevitably lead to patients taking the infection into their homes following discharge. Our study (n=35) concluded that current bags are unsafe and unfit for purpose:

- 52% of bags used in practice classified a camera bag, item of hand luggage or a plastic tool box
- 77% of bags used in practice were manufactured from an absorbent textile fabric
- 69% of bags were coloured black or black/blue
- 73% of bags used velcro as the primary method of fastening
- 15% used plastic clips
- 57% of bags were transported from patient to patient in the boot of their car
- 15% of bags are stored in a garage at the weekend
- 55% of nurses had never cleaned their bag once
- 26% cleaned their bag once a year
- only 6% of nurses cleaned their bag once a week

No national or international standards, guidelines nor regulations exist to affect choice of equipment or prevent the transmission of MRSA/ C.Diff/ E-coli by mobile healthcare workers and their infectious bags. This project has raised awareness of this omission at the highest level: Andrew Lansley, David Nicholson and Jane Cummings. We are now actively seeking revisions to the National Specification for cleanliness in the NHS & Healthcare Cleaning Manual relating specifically to medical bags used in the community; to provide detail about minimum cleaning frequencies, suggested cleaning plans and recommended design/ materials used in bags. This objective has far reaching benefits to providers, nurses and patients, both in the UK and around the world. We believe that this project will have a profoundly positive effect on nurse's health, wellbeing and morale, by ensuring that commissioners

comply with the 1992 Provision and Use of Work Equipment Regulation, Section 5-2:

***“In selecting work equipment, every employer shall have regard to the working conditions and to the risks to health and safety of persons which exist in the premises or undertakings in which that work equipment is to be used, and any additional risk posed by the used of that work equipment”***



## Process

Analytical, scientific, creative and experimental collaborative methods have contributed to the co-creation of a world-class nursing bag fit for the challenges of the 21st century:

- evaluation of bags/ nurse bag practice
- microbiology study of nursing bags used in practice
- capturing service narratives and envisioning aspirational products using Lego Serious Play
- analogous case studies of world class services delivered in confined spaces,
- comparative link analysis study old and new bag
- analysis of design forms/ effectiveness of hand decontamination using ultra-violet analysis techniques
- pressure analysis of differing hand wiping techniques
- three-centre validation study comparing the performance of a traditional bag against the proposed design intervention
- Qualitative questionnaires

## **Rigour**

A series of stakeholder workshops with personnel from NHS East Riding of Yorkshire that included the Assistant Director of Design innovation, Service Development Managers, NCT Clinical Leads, Nurse Consultants for Older People and Infection Control Specialists. High fidelity prototypes were used to evaluate the impact of product form on hand-contamination with data guiding design decisions. A three-centre validation study (24 nurses) compared the efficaciousness of the new bag against a contemporary nursing bag. A 21-question, questionnaire required participants to scrutinise the new bag in four key design performance indicators (DPI): functionality; usability; features and image.

The qualitative dataset recorded an overwhelming positive feedback in all DPIs, each exceeding a mean score of 7.35 out of 10. These positive reviews provided confidence to accelerate the commercialisation of the bag. Positive feedback arising from project presentations to regional, national and international audiences that included NHS ERY QIPP Groups, Yorkshire & Humber SHA Service Reform Panel, NHS Institute for Innovation and Improvement, Department of Health's Scientific & Technical Manager, Kaiser Permanente Group and the Innovation Learning Network instilled confidence of impact of the design intervention to existing practice, as well identifying that nursing bag practices observed at NHS ERY was not an isolated case but in fact resonating with national and global nurse bag practice.

A three-centre validation phase involving clinical simulations using an old and new bag verified the effectiveness of the proposed design intervention: service efficiency, productivity and quality. Increased performances were achieved by using a standardised approach to the storage and delivery of consumables (Sanchez-Rodriguez, 2006).

Analysis of video data revealed that the bag saved 60 seconds per treatment delivery thereby reducing the time spent in an uncontrolled environment but also produced net productivity saving of up to £1256 per nurse per year (Band 7). If diffused to all 250,000 NHS nurses working in the community this could deliver a potential saving of £314 million to the NHS total budget each year (approx. 0.31%).

## **Significance**

Globally over 1 billion people now receive their patient care in non-hospital settings (WHO, 2010). In acute settings the risk of MRSA is 1 in 10, outside of this setting the risk escalates to 4 in 10. This is increased risk attributed to mobile healthcare workers facilitating the spread of drug resistant infections through contaminated medical devices (World Patient Safety Alliance, 2009).

As the empirical evidence shows, 76% of all MRSA cases and 82% of C.Diff cases occurred in older patients (Health Protection Agency, 2008). Statistical data relating to the acquisition of MRSA and C.Diff in acute and non-acute settings is revealing. Data captured for 2010/11 records higher infection rates in non-acute setting than acute settings. Nationally, for MRSA there were 792 recorded case in non-acute with 688 cases in acute. Similarly for C.Diff, 10423 recorded cases in acute with 11,293 in non-acute settings. Yet the media attention is drawn to the risk posed by



hospital environmental and not where the risk is greater- community healthcare settings.

Our examination of the microbiology present on nursing bags produced the first UK data. The nursing bags selected for analysis were sourced from two NCT centres: Bridlington and Beverley. Each bag was tested in two specific locations using the 'plate' test method: on an internal face and externally on the base of the bag where it was likely to come into contact with household floors or car boot spaces. To ensure the efficacy of the results, a control test was performed on a brand new bag using the same procedures. The plate tests detected the presence of E-coli on the exterior of two bags and found MRSA on 33% of bags tested (on and inside bags). Surprisingly, test results revealed higher CFUs inside bags than on their exterior surfaces. Our findings suggest that the pathogens are transient as there is not a primary 'food' source such as spills/wetness within the bags for the bacteria to grow on. Furthermore, humidity inside bags may exacerbate their growth. This evidence suggests that cross transfer of items to and from nursing bags poses a greater risk than environmental factors. This is substantiated by the very low presence of bacteria found externally.

Our research has highlighted the importance of designing for cleaning rather than function- a design performance criterion applicable to any healthcare product and Internationally recognised by both clinical and design audience through international exhibitions, conference presentations, innovation awards and media requests. In 2010-2012 significance of the design research to patient safety was recognised by the Industrial Designers Society of America, Institute of Engineering Technology and the Department of Health- the only product to receive an award in the 2011 NHS Innovation Challenge Prize.

The competitive design advantages of the bag are:

- The material and design provide for effective cleaning reducing the risk of contamination from patient to patient
- Ease of cleaning will encourage frequent cleaning
- The bag provides a solid base, above ground level, from which the nurse can perform tasks
- The drawers give easy access to supplies required
- A standard design and method of working would allow efficiencies to be created by service providers
- Patients will be uplifted to see that their care is being undertaken safely and the general patient experience enhanced
- Nurses will be reassured that they are carrying out their duties in the most hygienic way practicable in a home environment

## **Supplementary Materials:**

### **(i) Publication of Creative Practice**

NHS Institute for Innovation & Improvement 2013. High Impact Innovations.

Department of Health.

Swann, D. (2011) *NHS at Home: A Co-design Research Project to Develop a 21st Century Nursing Bag*. Institute of Ergonomics & Human Factors, Contemporary Ergonomics & Human Factors 2011. Published in proceedings. Available at <  
<http://www.crcpress.com/product/isbn/9780415675734>>

Swann, D. (2011) *NHS at Home: Using Lego Serious Play to Capture Service Narratives and Envision Future Healthcare Products*. Include 2011: The Role of Inclusive Design in Making Social Innovation Happen, Royal College of Art, London.

NHS Institute for Innovation & Improvement 2013. High Impact Innovations.  
Department of Health.

Index: Design to Improve Life Awards 2011. *Provides Real Improvements in Patient Safety: 21st Century Nursing Bag*. [online] Available at:  
[http://www.indexaward.dk/index.php?option=com\\_content&view=article&id=364&Itemid=225](http://www.indexaward.dk/index.php?option=com_content&view=article&id=364&Itemid=225)

Danish Design Centre, 2011. *Copenhagen Design Week: Think Human*, p.12.

New Design Magazine 2011, *Home Help*, Issue 89, pp.52- 52.

## **(ii) Exhibition of Creative Practice:**

ROTOR Series: Mobilising Healthcare at Huddersfield Art Gallery 24 July-August 2013.

Healthcare Innovation Expo, EdExcel Centre, March 13-14th 2013. Europe's largest healthcare innovation event.

Index Award Exhibition World Tour 2011-2013: Copenhagen, Singapore, Luxembourg, Helsinki, Bauhaus, Risor, Huddersfield, Tallin, Hong Kong. INDEX: Award Exhibition has been presented in various formats in 12 countries around the world - seen by almost 10 million people. Available at:  
<[http://www.indexaward.dk/index.php?option=com\\_content&view=article&id=34&Itemid=12](http://www.indexaward.dk/index.php?option=com_content&view=article&id=34&Itemid=12)>



Copenhagen Design Week, 1-6 September 2011.

Kaiser Permanente's Innovation Learning Network's In-Person Meeting: Co-Designing the Future of Connected Healing, Oakland California, USA, 4-5 October 2011. The ILN brings together the most innovative healthcare organizations in the USA. It's mission is to foster discussion on the methods and application of innovation / diffusion, ignite the transfer of ideas, and provide opportunities for inter-organizational collaboration. Available at:  
<https://www.signup4.net/Public/ap.aspx?EID=ILNX12E>



1<sup>st</sup> European Design4Health Conference Exhibition 2011 Sheffield Hallam University 13 -15 July 2011.

### **(iii) Design Innovation/ Enterprise Awards:**

2012 Institution of Engineering & Technology Innovation Awards Finalist: Product Design category

<http://conferences.theiet.org/innovation/finalists/index.cfm>

2012 Nursing Times Award Finalist: Infection Prevention and Control category

<http://www.ntawards.co.uk/shortlist>

2011 NHS Innovation Challenge Prize Finalist & Highly Commended Award Winner: To reduce MSSA/ E-coli in a health community by 30%. Final awards chosen by Secretary of State for Health, Sir Bruce Keogh and David Nicholson.

<http://www.challengeprizes.institute.nhs.uk/the-list-of-challenges/>



2010 Industrial Designers Society of America's International Design Excellence Awards: Design Research category (1 of 5 finalists).

**(iv) Advocacy:**

Lord Darzi (2012) was appointed as Parliamentary Under-Secretary of State at the Department of Health in 2007. He was recently appointed as Chairman for the Institute of Global Health Innovation at Imperial College has personally requested project mages for inclusion in his presentations on design for infection control.

***'very impressive project...'***

Chris Gush, Head of Clinical Innovation and Research at the Royal College of General Practitioners and is ex-Scientific and Technical Programme Manager for the Department of Health, HCAI Technology Innovation Programme. The HCAI Technology Innovation Programme, working with key partner organisations, is a national programme over nine NHS Trusts, aiming to speed up the development and adoption within the NHS of new and novel technologies and medical devices.

***'Currently the majority of medical devices we use are primarily designed for their function with little consideration to cleaning or decontamination- with your bag it's the inverse.'***

Chris Howroyd, Programme Manager for Health, Design Council:

***'A fascinating project and innovative design, which will no doubt offer clinicians, patients and yourself with many long term benefits.'***

Julia Scharper, Former Service Design Lead at the NHS Institute for Innovation and Improvement:

***‘Your design process and in particular the prototyping session with NHS staff was truly an inspirational example of how co-design and anthropological observation techniques can help tackle service as well as product challenges as defined by patients and staff across a local health community.’***

Helen Green, Kirklees Community Healthcare Services:

***“The clean and cleanable aspects of it – fantastic in an age of MRSA. The uniformity of the idea - great and I do think the persona/visual smartens and counts, re: why we wear uniforms that look smart as well as practical”***

Bridlington NHS Neighbourhood Care Team Nurses:

***"You'd feel like a proper nurse wouldn't you!"***

***"I do like that idea."***

***"I think it's great!"***

***"I think it looks very organised, when you walk in and open it, it's more professional."***

***"I think that's a great idea [integrated treatment space] especially if it's just there on the carpet instead of their footstool."***

Dr Kate Ireland, NHS ERY's Director of Quality and Professional Services:

***“Neighbourhood Care Teams are our flagship service. The new nursing bag design offers the prospect of enhancing quality of care through the provision of an improved treatment space for patients whatever the patients' environment.”***

## **(v) Intellectual Property arising from Creative Practice:**

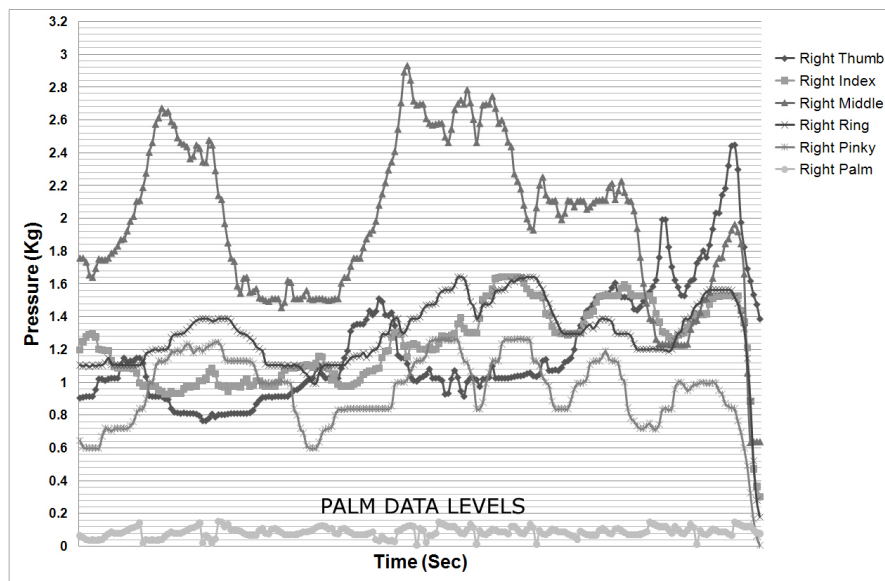
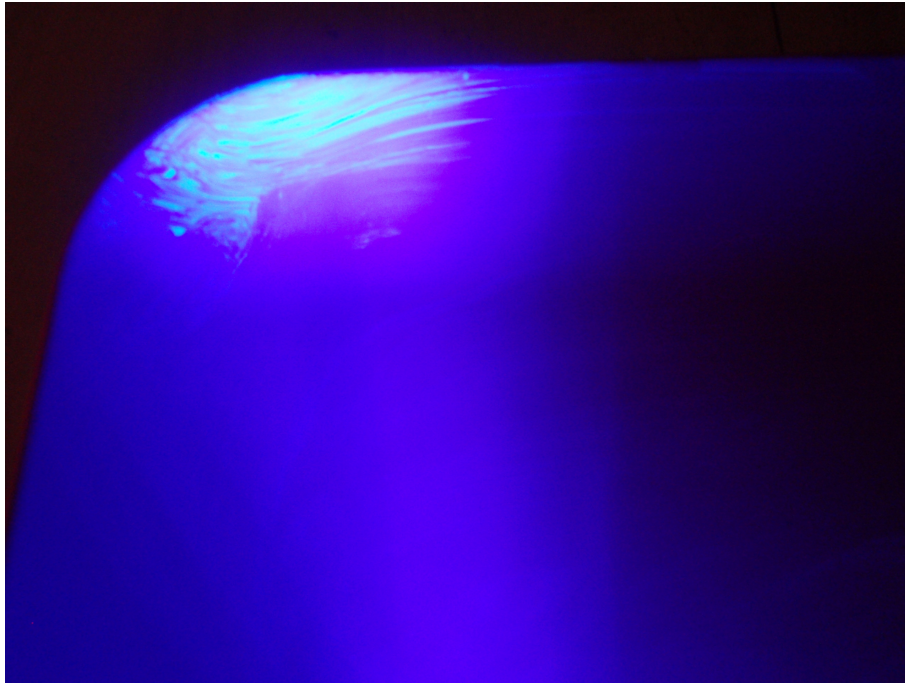
Swann, D., 2011. *Medical Bag*. EU Patent Application Number 11185488.1

Swann, D., 2011. *Medical Bag*. US Patent Application Number 13/253723



**(vi) Images:**





M:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	1	25.00%
Staphylococcus ssp	0	0.00%
Micrococci ssp	2	50.00%
Escherichia coli	0	0.00%
Other Coliforms	1	25.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	4	

1:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	24	12.50%
Micrococci ssp	168	87.50%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	192	

2:O		% of total
	total	viable colonies
MRSA	9	22.50%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	27	67.50%
Micrococci ssp	4	10.00%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	40	

3:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	0	0.00%
Micrococci ssp	0	0.00%
Escherichia coli	0	0.00%
Enterobacter aerogenes	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	1	100.00%
Total colonies	1	

4:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	2	15.38%
Micrococci ssp	1	7.69%
Escherichia coli	1	7.69%
Other Coliforms	6	46.15%
Bacillus ssp	1	7.69%
Unknowns	2	15.38%
Total colonies	13	

5:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	2	16.67%
Micrococci ssp	4	33.33%
Escherichia coli	1	8.33%
Other Coliforms	2	16.67%
Bacillus ssp	1	8.33%
Unknowns	2	16.67%
Total colonies	12	

6:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	10	66.67%
Micrococci ssp	3	20.00%
Escherichia coli	0	0.00%
Other Coliforms	2	13.33%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	15	

7:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	2	100.00%
Micrococci ssp	0	0.00%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	2	

8:O		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	1	14.29%
Staphylococcus ssp	6	85.71%
Micrococci ssp	0	0.00%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	7	

M:i		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	0	0.00%
Micrococci ssp	2	33.33%
Escherichia coli	0	0.00%
Other Coliforms	1	16.67%
Bacillus ssp	1	16.67%
Unknowns	2	33.33%
Total colonies	6	

1:i		% of total
	total	viable colonies
MRSA	15	8.38%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	71	39.66%
Micrococci ssp	84	46.93%
Escherichia coli	0	0.00%
Other Coliforms	4	2.23%
Bacillus ssp	1	0.56%
Unknowns	4	2.23%
Total colonies	179	

2:i		% of total
	total	viable colonies
MRSA	26	0.88%
None MRSA Staphylococcus aureus	1	65.79%
Staphylococcus ssp	75	65.79%
Micrococci ssp	12	10.53%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	114	

3:i		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	1	33.33%
Micrococci ssp	0	0.00%
Escherichia coli	0	0.00%
Enterobacter aerogenes	1	33.33%
Bacillus ssp	0	0.00%
Unknowns	1	33.33%
Total colonies	3	

4:i		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	10	100.00%
Micrococci ssp	0	0.00%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	10	

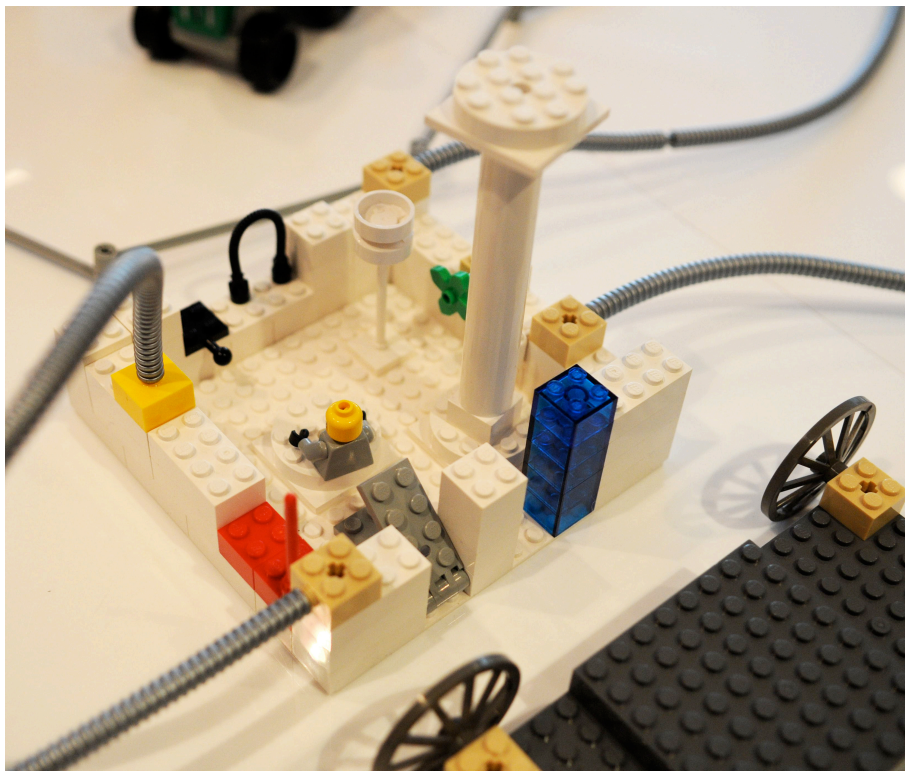
5:i		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	5	71.43%
Micrococci ssp	1	14.29%
Escherichia coli	0	0.00%
Other Coliforms	1	14.29%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	7	

6:i		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	6	85.71%
Micrococci ssp	1	14.29%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	7	

7:i		% of total
	total	viable colonies
MRSA	0	0.00%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	10	100.00%
Micrococci ssp	0	0.00%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	10	

8:i		% of total
	total	viable colonies
MRSA	1	4.76%
None MRSA Staphylococcus aureus	0	0.00%
Staphylococcus ssp	20	95.24%
Micrococci ssp	0	0.00%
Escherichia coli	0	0.00%
Other Coliforms	0	0.00%
Bacillus ssp	0	0.00%
Unknowns	0	0.00%
Total colonies	21	

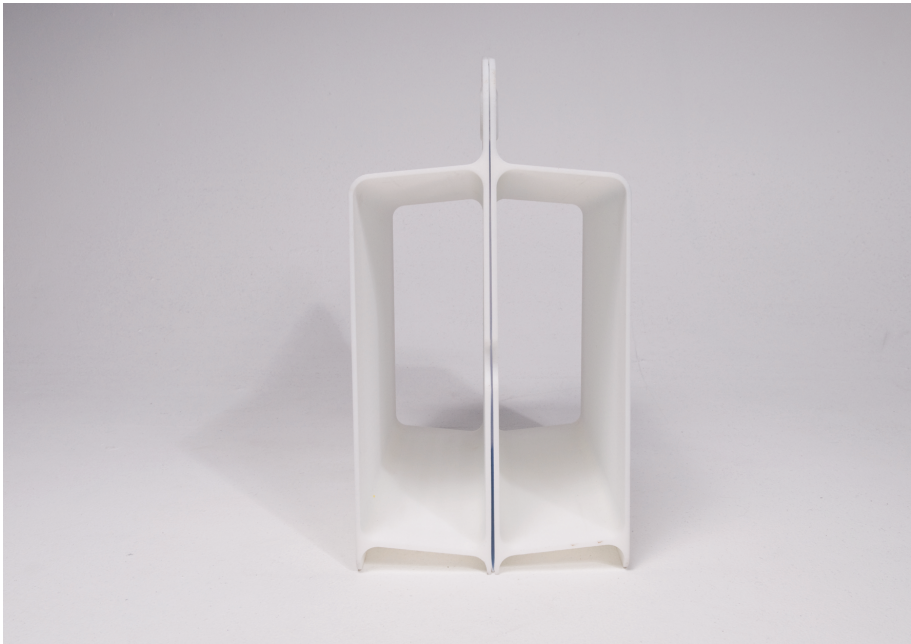
















### (vii) Media:

Interviewed on The Health Show, Series 1, Episode 5, 2011. [TV programme], BBC World. 20 August 2011, 11.15am. BBC World News reaches 241 million people every week, available in 296 million homes, 1.8 million hotel rooms and has the highest average viewership on a weekday of any international news channel. The Health Show is a new 26-part series for BBC World News covering the most important news stories from around the world.

<http://rockhopper.tv/programmes/579/>

<http://www.bbc.co.uk/news/world-radio-and-tv-14614670>



<https://vimeo.com/26325435>

<http://www.dh.gov.uk/health/2012/06/winners-innovation-challenges/>

[http://www.science20.com/news\\_articles/redesigning\\_medical\\_bag\\_could\\_cut\\_mrsa\\_worldwide-92308#comments](http://www.science20.com/news_articles/redesigning_medical_bag_could_cut_mrsa_worldwide-92308#comments)

<http://www.bbc.co.uk/news/world-radio-and-tv-14614670>

[http://www.publicservice.co.uk/feature\\_story.asp?id=20534](http://www.publicservice.co.uk/feature_story.asp?id=20534)

<http://rockhopper.tv/programmes/579/>

<http://www.travelnursingjobcompany.com/related-articles/top-5-bags-for-home-healthcare-nurses.html>

<http://humansindesign.com/post/5769165980/humans-in-the-design-of-nursing-bags>

<http://www.fastcodesign.com/1664460/a-nursing-kit-for-the-21st-century-is-made-for-saving-lives-in-the-field>

<http://nominateforindexaward.dk/Presentation/read/id=MjM0>

<http://www.govtoday.co.uk/infection/12427-home-improvements>

<http://www.staffnurse.com/blog/2012/07/24/anti-bug-medical-bag/>

<http://www.idsa.org/content/content1/nhs-healthcare-home>

<http://surfaceasiamag.com/read-news-2-0-424-a-betterdesign.surfaceasia.magz#.T5R4RXhQbIY>

<http://www.hesmagazine.co.uk/show.php?page=story&id=2201&story=2201>

<http://research.shu.ac.uk/lab4living/design4health>  
<http://www.healthactionaids.org/?m=201208>  
<http://www.youtube.com/watch?v=QwzqjYV-cpY>  
<http://www.hesmagazine.com/show.php?page=feature&newsPage=11&id=2339&story=2339>  
<http://www.pdesigni.com/news/show/2403>  
<http://wncfunctionalhealth.com/Dont-buy-Nurses-Bag-Before-you-Have-Read-This.htm>  
<http://www.medicalnewstoday.com/articles/248150.php>  
[http://www.buildingbetterhealthcare.co.uk/news/article\\_page/Ergonomics\\_helps\\_shape\\_a\\_21stcentury\\_nursing\\_bag/74458](http://www.buildingbetterhealthcare.co.uk/news/article_page/Ergonomics_helps_shape_a_21stcentury_nursing_bag/74458)  
<http://clinicaltoxicology.net/nurses-medical-bag-reduces-mrsa-risk/>  
<http://www.mrsaidblog.com/2012/08/1-in-3-nurse-bags-carry-deadly-superbug-mrsa/>  
[http://www.science20.com/news\\_articles/redesigning\\_medical\\_bag\\_could\\_cut\\_mrsa\\_worldwide-92308](http://www.science20.com/news_articles/redesigning_medical_bag_could_cut_mrsa_worldwide-92308)  
<http://www.computescotland.com/doctors-bag-gets-redesign-5437.php>  
<http://socialmedia.trademarkia.com/socialmedia/username-21st-century-nurse-bag-75892847.htm>  
<http://www.designer.com/news/23383>  
<http://www.pdesigni.com/innovations/medical>  
<http://www.lightsmanufacturer.com/2011/07/helen-hamlyn-design-awards-2011.html>  
<http://blog.nurture.com/2011/08/11/mobile-healthcare-a-new-black-bag/>  
[http://www.idsa.org/aggregator/2010/10/07/interactive/2009/03/10/us/www.hdr.undp.org/en/media/interactive/2009/03/10/us/www.vam.ac.uk/activ\\_events/events/friday\\_evenings/friday\\_late/events/sept2010/index.html?page=155](http://www.idsa.org/aggregator/2010/10/07/interactive/2009/03/10/us/www.hdr.undp.org/en/media/interactive/2009/03/10/us/www.vam.ac.uk/activ_events/events/friday_evenings/friday_late/events/sept2010/index.html?page=155)  
<http://www.ff3300.com/wordpress/tag/bacteria/>  
<http://www.innovationlearningnetwork.org/>  
<http://www.dsr.dk/Nyheder/Sider/Sygepleje-i-nyt-design.aspx>  
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## **Other:**

Invited speaker: Innovation in Healthcare Services Workshop to Norrbotten County Council & National Government representatives from Sweden, 7<sup>th</sup> November 2012

Research images requested by Lord Darzi and the Global Forum for Health Research & Council on Health Research for Development. Available at <http://www.forum2012.org/about-forum-2012/forum-2012-background>

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Webinar presentation Innovation Learning Network, 23rd June 2011: Future Healthcare in the Bag.

NHS East Yorkshire Primary Care Trust's Clinical Executive Board, 16<sup>th</sup> June 2011.

Yorkshire Centre for Health Informatics, University of Leeds, 5<sup>th</sup> July 2010.

Yorkshire & Humber Strategic Health Authority, Service Reform Panel, 12th May 2010.