Survey of the knowledge and correct use of Scrub Suits, Gowns and Clean Air Suits in Portuguese hospitals

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ABSTRACT: Comfort in clothing is a growing concern in the textile and clothing industry and it must be considered when it comes to develop or improve textile products. In Operating Rooms (OR) clothing it's also important to consider comfort as one of the essential requirements of any equipment or device, because products are formulated normally just to meet the primary requirements of protection. The requirements of comfort are thermo-physiological parameters that allow the evaluation of textile materials and its behaviour, which is the basis for the development of new products and enable the construction of functional clothing systems which meet the needs of the user. This work aims to gather the opinion of health professionals in Portugal about the knowledge and correct use of scrub suits and gowns and is part of a major study about the use of Clean Air Suits (CAS) for controlled environments (OR). These type of garments are designed to minimize contamination inside the O.R. and in the same time not compromising the comfort of the user. As a result it was possible to perceive that the Clean Air Suit is a little-known clothing system in Portugal and that health professionals are not well aware of the features and benefits of it. Also, the clothing systems used today, in Portuguese hospitals, present several lacks associated e.g. with thermal comfort, showing that the Portuguese health system need an incremental improvement in the relation of protection vs. comfort.

1 INTRODUCTION

Nowadays, comfort is a requirement almost mandatory, when designing protective equipment or any other user-focused product (Das and Alagirusamy, 2010). Also in controlled environments, such as OR theatres it is important to consider the comfort as an integral part of the requirements of protective clothing or Medical Device (MD), since this type of equipment is formulated just to meet the primary requirement: protection (James, 2011).

The Directive 2007/47/EC has been broadened such that according to the intended use declared by the manufacturer some products can be qualified as Personal Protective Equipment (PPE) as well MD, existing a criteria of dual use. But, PPE for use in the medical field must not automatically be medical equipment. These products shall meet the requirements of both directives, but the assessment should be done in accordance with the MDD procedures. This creates a lot of problems since the categorization is very different in both directives (Abreu, 2010).

The standard EN 13795:2011+A1:2013 “Surgical drapes, gowns and clean air suits, used as medical devices for patients, clinical staff and equipment. General requirements for manufacturers, processors and products, test methods, performance requirements and performance levels” shows the requirements for protections related to each type of clothing system and presents some informative notes (in annex C) about comfort (EN 13795, 2013).

The clothing system, Clean Air suit (CAS), was conceived for sterile and ultra-clean environments, and were initially proposed and used for orthopedic surgery, passing to be used also in other surgical specialties. The main feature of the CAS's is the containment of skin particles, not allowing its release to the outside, since it is a clothing system closed at the ends (sleeves, ankles, neck and head area) with cuffs. By standard definition, a CAS is a suit intended and shown to minimize contamination of the operating wound by the wearer's skin scales carrying infective agents via the operating room air, thereby reducing the risk of wound infection. It is also important to refer that unlike the suit usually worn in the OR, the CAS is designed to reduce the operating contamination by personnel (Abreu, 2014). This kind of medical device is considered as Class I—medical

Comfort in medical textiles has been a very much studied subject, by authors like Hennigh (2009, 2015), Oliveira (2006, 2008) and Abreu (2014, 2015) that are proving that comfort can influence the performance of professionals. The lack of comfort, specifically thermal and ergonomics characteristics can lead to thermal stress that influence the physical and psychological conditions of the surgeon, as the ability to maintain constant vigilance and concentration which the correct surgical intervention (Hohenstein, 2011, Abreu, 2015). Also the fit and size, lightness and weight of the clothing system can influence performance (Das and Alagirusamy, 2010).

Within the framework of the Vale Inovação project 2012/24228 “Development of clean air suit” related to improving comfort to this specific medical clothing system, was made the inquiry presented in this paper that played an important role in the opinion of Portuguese professionals related to clothing systems used in the OR. These kinds of inquiries are important to gather data from all healthcare professionals to detect problems directly from the point view of the user.

In this study were included three medical clothing systems, most used in the OR: scrub suit, surgical gown and clean air suit.

Scrub Suit (SS) is a clothing system known in Portuguese for the common word "pyjama" and is like a daily uniform, normally made of woven cotton (Ribeiro, 2014).

Surgical Gown (SG) is the main protection for professionals and patients inside the OR and it is only dressed when is to perform a surgical intervention. Normally, in Portugal, disposable surgical gowns are used, made of SMS or spunlace polypropylene or polyester (Ribeiro, 2014).

Clean Air Suit (CAS) is a clothing system that is used to prevent infections inside the OR, usually made of polyester or other synthetic fibres, it can be single-use or reusable, made of polyester, polypropylene and in the case of reusable with a carbon filament (Ribeiro, 2014).

After knowing the main clothing used inside the OR, was pertinent to know, of the opinion of the user itself. If professionals are satisfy with Scrub Suit (SS) and Surgical Gown (SG) and gather data about the level of awareness for Clean Air suits (CAS) products once it is not used in Portuguese hospitals. So the aim for this study was to ask Portuguese professionals about some comfort aspects related to heat, sweat, softness and other comfort requirements related to each of the studied clothing systems.

<table>
<thead>
<tr>
<th>Table 1. Example of Likert scale of attitudes.</th>
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<tbody>
<tr>
<td>TD</td>
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<tr>
<td>TD–Totally disagree; D–Disagree; DA/ND–I don’t agree/nither disagree; A–Agree; TA–totally agree.</td>
</tr>
</tbody>
</table>

2 MATERIALS AND METHODS

The inquiry construction was made according to the Likert scale of attitude (Brandaíze, 2005) with questions for each person to evaluate the clothing system and the comfort characteristics, using a scale of 0 (zero) to 5 (five). For example, see Table 1.

The inquiry was divided in three parts. The first part was related to Scrub Suits (SS), the second part dedicated to Surgical Gowns (SG) where the same questions were applied to the two different clothing systems about the perception of touch, lightness, breathability, bad odours and easy-difficulty of dress/undress the clothing system. The third part was dedicated to Clean Air Suits (CAS). Once knowing that CAS is not used in Portugal the questions were different from the asked in part 1 and 2. This third part was to know if this kind of suits and their important functions and characteristics are known by Portuguese professionals.

This part was complemented with questions that allowed the inquired person to reply with descriptive explanations to get more details regarding the professionals' opinion.

In matter of statistical data, the person had to mark if “Female” or “Male”, Professional Occupation/Position and Age.

The inquiry was performed through an online platform, Google Forms. After 1 month the answers were organized with SPSS predictive analytics software and the results interpreted. A similar methodology was used by Hueston (2011) using the same type of inquiry structure and data analysis.

The inquiry was made at the hospitals Hospital de Santo António in Porto and Hospital Conde de Bertrandos, in Ponde de Lima selecting a non-random sample. The number of answers was 60 (valid inquiries).

3 RESULTS AND DISCUSSION

To this inquiry 60 nurses replied with ages between 25 and 57 years 44 female, representing 73% of the answers and 16 male, representing 27% of answers.

Table 2 shows the occupation/position of the total number of nurses that answered to the inquiry.

<table>
<thead>
<tr>
<th>Table 2. Total of occupations/position.</th>
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<tbody>
<tr>
<td>Nurse anaesthesia</td>
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<td>Nurse Instrumentalist</td>
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<td>Perioperative (OR)</td>
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<tr>
<td>Nurse surgical</td>
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<tr>
<td>Nurse (paediatric, rehab)</td>
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<tr>
<td>Total answers</td>
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We can see that 57% specifying they speccia professionals are related notions and routines.

For the study, the related directly to the represent the suit was used just inside the OR, were significant and clothing systems, be tant to future develop.

The results were us ing systems and relations that were asked, t to TA (totally agree) differences and relat questions.

3.1 Results and expl

The first results are r fessionals about SS are. Usually the user feels as comfort. Comfort is the most important one, in it can explain why 28% agree/neither disagree, how comfort is beside it and we can notice other requirements of fresh movement and good odours, which if SS were most of single-use SS. With cotton SS is sweat once cotton heat and for that 27% “disagree”.

Good touch is an inner because SS are di
Table 2. Total of answers of professionals, by occupation/position.

<table>
<thead>
<tr>
<th>Occupation/position</th>
<th>Answers</th>
<th>Answers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse</td>
<td>34</td>
<td>57%</td>
</tr>
<tr>
<td>Nurse anaesthesia</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Nurse Instrumentalist</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Perioperative (OR)</td>
<td>14</td>
<td>23%</td>
</tr>
<tr>
<td>Nurse surgical</td>
<td>8</td>
<td>13%</td>
</tr>
<tr>
<td>Nurse (paediatric, rehab)</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Total answers</td>
<td>60</td>
<td>100%</td>
</tr>
</tbody>
</table>

We can see that 57% of inquiries are nurses, specifying their specialty, however 23% of the professionals are related directly with the OR conditions and routines.

For the study, the opinion of nurses who were asked related directly to the OR, was very important once they represent the main type of user's, because CAS is used just inside de OR. However, all the opinions were significant and considered, related to other clothing systems, because they are always important to future developments.

The results were assembled for the studied clothing systems and related to all the comfort properties that were asked, between TD (totally disagree) to TA (totally agree), to be easier to understand differences and relations between all the asked questions.

3.1 Results and explanation of Scrub Suits (SS)

The first results relate to the opinion of professionals about SS and could be seen in Figure 1. Usually the user does not think of features such as odour. Comfort issues are not easy perceptible to the user, in their daily work. For that, we can explain why 28% of inquiries answered "Not agree/either disagree". We can realise, with this, how comfort is aside of almost every clothing system and we can notice that the user is not aware of other requirements of the clothing system/equipment besides protection. 25% of inquiries answered "agree" meaning that, they think that SS present bad odour when used. This happens because after several hours with the same clothing system and with frantic movements, sweat and heat accumulate and bad odours starts to be generated. Especially if SS were made of synthetic fibres, like the most of single-use SS, made of 100% polypropylene. With cotton SS it is easier to manage heat and sweat once cotton has good moisture absorption and for that that 27% of professionals answered "disagree".

Good touch is a very important comfort property because SS are directly in contact with the skin and they need to be soft and fit well to the user. Observing Figure 1 again, we can see that 33% of the professionals “disagree” with SS having a good touch. Once more these answers can be related to single-use SS that at first touch are soft, but when used for several hours can start discomfort in contact with the skin and even start rippling in areas of greater friction. Only 17% of professionals answered “Agree” which mean that, in general good touch is a property that needs to be improved in SS once this clothing system is used in daily hospitals, healthcare centres and other facilities related to medical sector.

Professionals were asked if they think that SS is breathable because breathability is the most important comfort property in this study, once it will influence other properties like thermal balance, moisture and heat management. The majority of inquiries “agree”, around 38% but still 27% of them answered “disagree”. These differences can be explained by the two types of SS used in portuguese hospitals: single-use (polypropylene, polyester) and reusable (cotton). Those who wear single-use agreed that SS are not breathable enough and those who wear cotton answered “agree”.

As for lightweight most of inquired “agree” which is an expected answer because both single-use and reusable SS are thin and light.

Most of professionals (around 60%) also think that SS are easy to dress, also an expected answer, once they are basically a combination of a t-shirt and trousers.

3.2 Results and explanations of Surgical Gowns (SG)

Next we asked the same questions, only regarding to the Surgical Gowns (SG). And the answers are showed in Figure 2.

Surgical gowns are used only in OR, a place with controlled temperature and air humidity and more cold than other hospital areas, with a permanent flux of air renovation.
For surgical gowns most of the inquired agreed that SG present good touch, are easy to dress and present good lightweight properties, but for bad odours and breathability properties they "disagree". This occurs because SG in Portuguese hospitals are always single-use, made of SMS and/or spunbond polypropylene or polyethylene. Some synthetic fibers are not a good choice when it comes to wear it on surgical interventions. The user doesn't feel comfortable with them, and some interventions can last for 12 hours or more. Sometimes surgeons have to change the SG once or twice during the same surgery. For SG a major change must be done in order to improve comfort for the user. The properties breathability and odour management that are deeply related, lead to physiological stress to the user, decreasing his attention and consequently the ability to perform the surgery.

At the end of the inquiry were open questions (allowing to the user explain its opinion with more detail) about important issues regarding changes that may be considered or wanted in SS and SG.

To the question “Do you consider that any changes should be made in SS and/or SG?” the opinions of professionals were almost the same. Regarding changes in SS user said:

- Should fit better—sizing problems;
- It should always be single-used materials;
- Soft materials and breathable fabrics.

Regarding changes to SG user said:

- Need to be more breathable;
- Heat less, during the use.

Easily we can distinguish two type of users: the ones that prefer reusables and the ones that prefer single use systems. This are also expected answers once single-use vs. reusables are always being compared and both present advantages and disadvantages. But in matters to comfort and user wellbeing, reusables stand out for breathability and heat management.

3.3 Results and explanations of Clean Air Suits (CAS)

The third part regarding the knowledge about clean air suits was to verify what professionals think regarding of this innovative clothing system.

As expected, only 33% of professional medical staff knew what a CAS is and 67% of the people do not knew this kind of suits.

After this question we gave a definition of a CAS, according with EN 13795:2011+A1:2013: Surgical drapes, gowns and clean air suits, used as medical devices for patients, clinical staff and equipment. General requirements for manufacturers, processors and products, test methods, performance requirements and performance levels. Then we asked professionals if they would use a CAS, and if yes, what would it be: single-use or reusable (Figure 3).

The major answered single-use CAS (65% of answers). Only 22% of professionals think otherwise, considering that if, they use a CAS, it would be reusable.

This question was followed with an open question (allowing to the user explain its opinion with more detail, once it is important to obtain detailed information for their choices. For people how answered single-use CAS the general opinion the advantages were cost-benefit, security in relation to cross-infections; avoiding wash and reproces concerns, degradation of reusable materials, during several uses; higher control against infections and bad odours. As for the people how preferred reusable CAS, the advantages were that it's more comfortable and that single-use had bad odours, bad touch and they aren't breathable. Also, better fit—good sizing was stated.

4 CONCLUSION

This inquiry was an important contribution to the knowledge of Portuguese professionals regarding this clothing systems related to medical healthcare.
once there are few studies about user's opinion. This kind of knowledge is very important for the producers and manufacturers. We could collect some data and understand what professionals in medical healthcare, specifically in Portugal, know and think about SS, SQ and CAS. Sometimes the user don't stop to think about the clothing systems they wear and the related comfort problems. This problems can decrease attention and cause even more stress to professional activities, like performing a long hour surgery (Portuguese hospitals do not use clean air suits but it is necessary to aware professionals of new and better clothing systems, like CAS already used in northern countries like Sweden, Denmark, Switzerland or Holland. The clothing system CAS is a better way to control infections and improve the cleanliness and hygiene inside the OR and at the same time it can provide a good comfort experience to the user.

We could also notice a general opinion regarding single-use not being comfortable compared with reusable that offer better properties in heat and moisture management. It is important to consider the problems identified within this inquiry and study them deeply, because some changes are imperative, like improving thermal comfort in single-use clothing system.

It is essential to notice that this inquiry needs to be extended to all portuguese hospitals, public and private in order to make this study more reliable and profitable to get data from all hospitals and see if the problems detected with this inquiry will be the same when we increase the number of professionals answering. Finally better understand comfort issues in healthcare clothing systems and foresee how we can intervene to improve comfort, regardless of maintaining always the essential protection requirements.

REFERENCES


EN 13795: 2011+A1:2013—Surgical drapes, gowns and clean air suits, used as medical devices for patients, clinical staff and equipment. General requirements for manufacturers, processors and products, test methods, performance requirements and performance levels.


