

THE FUZZY FRONT END PHASE OF PATIENTS' CLOTHING DEVELOPMENT

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Abstract: *To ensure a comfortable life activity of people with various diseases clothing should take into account the peculiarities of the course and treatment of disease and should be a different type of clothes than the usually used. Research aim is to increase the level of satisfaction of the sick people in hospitalization with special clothing appropriate to its condition of exploitation. In such way it is necessary to establish the submitted requirements to clothing products. Determination the conditions of exploitation for ensure the vital functions of sick persons and identification the submitted requirements to clothing was effected by sociological questionnaire which have survey all component parts of the exploitation process, as are sick persons, medical staff and relatives who are caring for the sick. The results of the questionnaire were processed by statistical analysis and determined the level of consensus of participants.*

Keywords: *People with disabilities, comfort requirements, textiles, questionnaires, function and classification of hospital garments.*

1 INTRODUCTION

One of the indicators of social development is its attitude toward vulnerable people - children, old age people, sick and disabled. The problem of ensuring patient comfort is an interdisciplinary, which has deep aspect in terms of patient care by medical personnel and influence of environment. Welfare of the patient is assured of normal environmental conditions, inpatient medical care and clothing. Clothing as the object of ensuring comfort can be appreciated in terms of commodity, because it provides the normal physiological processes of the human body. Currently textile products for patients are developed as bedding textile materials using special processing, for example, antibacterial, or materials with high sorption properties. At the same time there are varieties of clothing products for people with limited movement, which is different from usual clothing by constructive functional structure adapted to the lifestyle of these people.

It should be noted that foreign researchers are actively being developed as new materials that promote the healing and functional hospital clothes, which facilitates the holding of medical procedures and manipulation in the treatment of patients [2]. In Moldova, the researches of design hospital garments almost non-existent, as the budgets of medical establishments are limited and difficult to provide decent medical assistance and medical workers' salaries.

At the same time develop the clothing products adequate to patients depending on the type and severity of disease presents a scientific problem to develop ergonomic products that will be possible to ensure the patient's life quality, care and comfort to serve these people.

2 EXPERIMENTAL

Initial process of pre-development of innovative products is defined as those activities that take place before the development of formal, well-structured new products. In fact, the initial pre-development "fuzzy front end" is the initial phase of generating ideas and developing new product concept [5]. Fuzzy front end in generally consists of three tasks: strategic planning, concept generation and, particularly, pre-technical evaluation of product design. Vague, indistinct fuzzy initial process comes from the uncertainty in technology, customer requirements, markets, resources, capabilities and limitations of the company.

In this context it is important to identify customer requirements in accordance with conditions of exploitation. Study on identification requirements submitted clothing products was performed by a sociological survey (Figure 1) [3, 4]. Research aim is to Increase the level of satisfaction of the sick people in hospitalization with

special clothing appropriate to its condition of exploitation. In Such way it is Necessary to Establish the Requirements Submitted to clothing products.

Determination the conditions of exploitation for ensure the vital functions of sick persons and identification the submitted requirements to clothing was effected by sociological survey which have study all component parts of the exploitation process, as are sick persons, medical staff and relatives who are caring for the sick. The questionnaires are developed for all groups of respondents, with the goal for multilateral study.

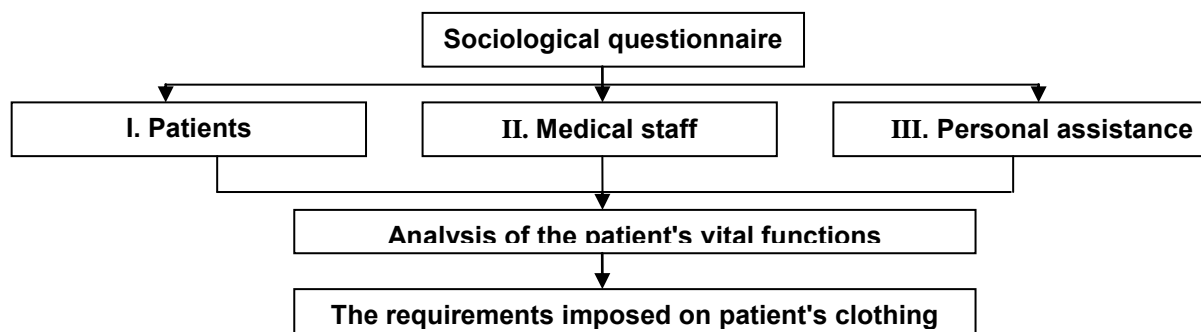


Figure 1: The conceptual approach to defining the requirements of patient's clothing

The first group has presents patients, selected by the type and severity of disease. The second group presents medical personnel performing medical treatments to these patients. The third group is made by carers (relatives, etc..).

Questionnaires were developed for assessing various aspects of clothing product. In terms of patient's clothing product can be evaluated through the patient's physical condition (type and severity of disease, degree of immobility, cause movement limitation, restricting motor skills, degree of personal care, body parts exposed to treatment) conform following items: assortment of clothes (the type of products used, the degree of satisfaction, wishes), aesthetics, convenience in dressing, undressing, hygienic properties of fabrics, comfortable touch materials, suggestions for improvement or development, quality and price.

Medical personnel may give specify information about clothing in dressing - undressing, convenience to perform specific medical procedures, maintenance of convenience products, composition of the optimal assortment of clothing products, quality and price. Personal assistance can appreciate clothing product in terms of commodity in dressing - undressing, maintenance products, product reliability (resistance to wear of materials and seams' resistance), composition of the optimal assortment of clothing products, quality and price.

The questionnaire methodology involves using different ways of it organizing like as individual, so in groups. The individual questioning requires much time for execution, but allows obtaining original responses, own opinions, unexpected ideas and was applied for discussion with patients and carers. The group questioning may provoke discussion on questions and formulate collective opinion such way of survey was performed for medical staff. In this case the person conducting the interview has an important role, directing the discussion by submitting arguments and counter arguments, excluding influence of one single opinion.

In the present work were held surveys of patients, carers and medical staff of the hospital number 3 of Chisinau. The basic is a survey of patients, which was supplemented by views and opinions expressed by the medical staff and carers. The group of patients who participated in the survey consisted of 43 women and 26 men. Patients were asked to ranging the requirements for clothing. The first rang is assigned to the most important requirement, according to the view of respondent, the second for next in importance, etc.

Data processing is to estimate the degree of consensus about the importance of patients' requirements and the calculation of summary characteristics of the survey.

To assess the consistency of respondents' opinions was determined the *coefficient of concordance* [1],

$$W = \frac{\sum_{i=1}^n (S_i - \bar{S})^2}{\frac{1}{12} \cdot m^2 \cdot (n^3 - n) - m \cdot \sum_{i=1}^m T_i} \quad (1)$$

where : m - number of patients who participated in the survey;
 n - number of requirements;
 S_i - the sum of rang estimates for each requirement;

S - average sum of rangs for all requirements.

$$T_i = \frac{1}{12} \cdot \sum_{i=1}^u (t_i^3 - t_i), \quad (2)$$

where: u - the number of rangs with the same estimates for the i-th patient;
t_i - number of evaluations of the same rang of the i-th patient.

As closer to 1 is the coefficient of concordance W, then is better the consistency of respondents' opinion. The significance of coefficient of concordance W is estimated by Cochran criterion:

$$\chi^2 = W \cdot m \cdot (n - 1) \quad (3)$$

If $\chi^2 > \chi_{tab}^2$. Then coefficient of concordance W is significant.

The coefficients of the importance (ponderability) of each indicator are determined by the formula:

$$j_i = \frac{m \cdot n - S_i}{0,5 \cdot m \cdot n \cdot (n - 1)} \quad (4)$$

3 RESULTS

Among the requirements for the clothes were nominated: hygienic, comfort, reliability, esthetics and economics. Processing of the survey data revealed more significant requirements for clothing. To do this, doing the necessary preliminary calculations, the coefficient of concordance was established, which is: for female patients W = 0,6056; for male patients W = 0,704. Thus, we conclude that the views of patients, in general, have been agreed.

The significance of the coefficient of concordance W was assessed by the criterion of Cochran, the table value is 13.3 (with a probability of 99% [1]), the actual value of the criterion of Cochran for female patients is 104.17 for the male patients is 64.8. Thus the coefficient of concordance W is significant with a probability not less than 99%.

Next, assess ponderability requirements. The obtained values of J_i (4) for each requirement are given in the Table 1. The sum of all coefficients must be equal to the value 1, ie, $\sum j_i = 1$.

Table 1: Indicators of the importance of the requirements to hospital clothing

Patients	The importance of requirements					Total
	Hygiene	Comfort	Esthetic	Reliability	Economic	
Women	0,341	0,307	0,164	0,114	0,073	1,0
Men	0,363	0,302	0,061	0,185	0,089	1,0

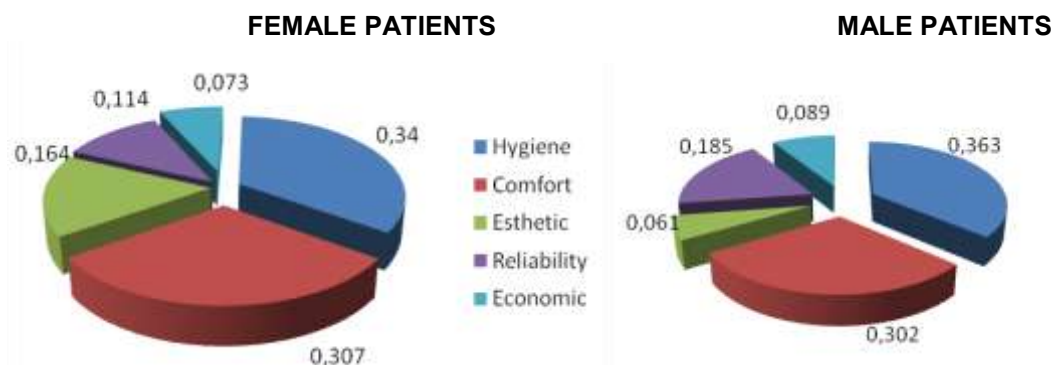


Figure 2: Diagram of distribution of the importance of the requirements to hospital clothing.

As a result of data processing were established the requirements to hospital clothing, and were determined their importance from the viewpoint of the patients (Table 1).

4 DISCUSSION

When ranking the requirements for hospital clothes, the most significant were determined as hygienic and comfort of clothing that meets the ergonomic requirements for hospital garments. The high ergonomic qualities provide comfort to the patient and medical staff for carry out various medical procedures. The least significant indicator is the cost of clothing. Among the requirements of esthetics and reliability the men' and women ' opinions are differed: women consider the appearance of clothing is more important, men prefer more reliable. Analysis of exploitation conditions of hospital cloths allowed developing a framework of requirements for hospital clothes, which is presented in Table 2.

Table 2: Requirements for patient's clothing

Requirements	Purpose	Means to achieve the aim
Protective	Protecting patients from exposure to biological agents	<ul style="list-style-type: none"> ➤ using of materials with antiseptic, antibacterial properties; ➤ minimal division of forms; ➤ reducing the number of stitches
Ergonomic: -hygienic	Providing comfort apparel climate and temperature	using materials with the following properties: <ul style="list-style-type: none"> ➤ thermal conductivity; ➤ air permeability; ➤ hygroscopicity; ➤ moisture conductivity
-anthropometric	Conformity of the product with the size, shape, body proportions of the figure, the ease of dressing, undressing	<ul style="list-style-type: none"> ➤ selection of an optimal design solution (form, cut, silhouette, optimal gain on the encirclement freedom, the length of the product, the length of the sleeves); ➤ weight of the product (up to 10% of body weight); ➤ an optional structural elements (slots, zipper, pockets); ➤ the presence of additional components (hood, gloves, blankets for damaged limbs)
-psycho-physiological	Excluding the negative impact of clothing on the patient's body	<ul style="list-style-type: none"> ➤ the use of thin, light and soft materials; ➤ design and location of stitches and zippers; ➤ use of the textile structure with minimum area of supporting surface; ➤ use of materials with the effect of massage
Exploitation	Wear resistance	<ul style="list-style-type: none"> ➤ durability; ➤ ease of care and washing; ➤ resistance to high temperatures for disinfection; ➤ stability of the linear dimensions; ➤ color stability to repeated washing and disinfection
Esthetical	The relevance and universality, hide physical defects	<ul style="list-style-type: none"> ➤ comfortable color solution; ➤ compliance with fashion trends; ➤ visual accent of the healthy body zone
Economics	Reasonable price, the minimum cost to keep appearance of a product	<ul style="list-style-type: none"> ➤ the cost of material; ➤ material capacity; ➤ standardization and unification; ➤ price of the product; ➤ costs of exploitation of the product

Having determined the basic groups of the requirements for clothing for patients, it is possible to develop a framework for quality of materials used for this type of clothing. Nomenclature of quality indices makes it possible to assess compliance with the requirements of selected materials. And also take into account the requirements for materials at the stage of material selection in designing new products.

Thus, to the requirements for materials for hospital clothing has been developed nomenclature of quality indicators (figure 3).

Analysis of exploitation conditions patient's clothing allowed to develop a classification of hospital garments used by patients in a medical institution, depending on the severity of the disease. Thus, we consider three groups of patients with complete, partial and minimal immobility, which is a consequence of illness, injury or

surgery. Accordingly, each of the groups of consumers using various types of garments that allows to create favorable conditions for the maintenance of patients.

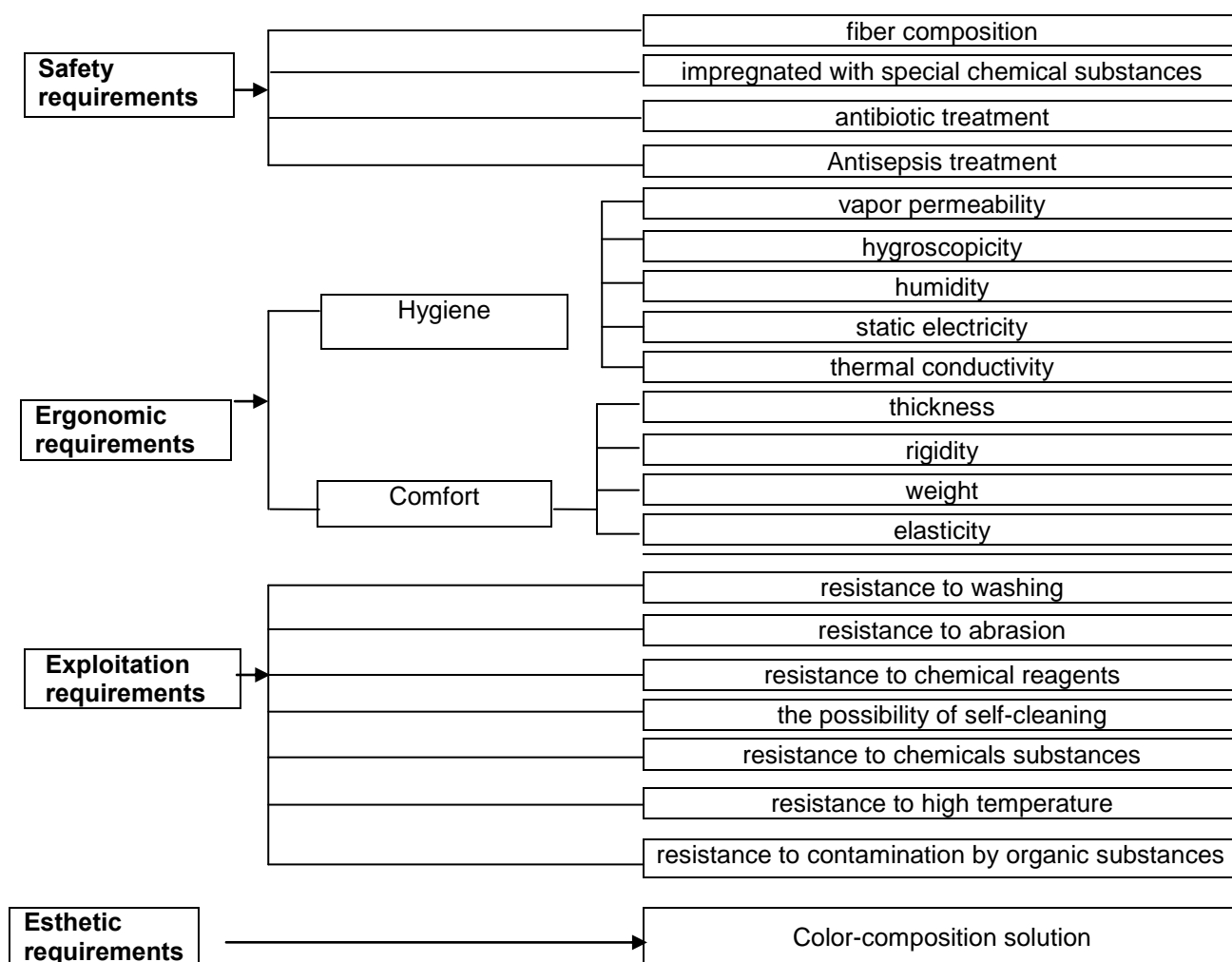


Figure 3: Nomenclature of indices of quality of textile materials for patient's clothing

5 CONCLUSIONS

The studies revealed specifics of exploitation of such garment, identified needs, defined requirements for patient's clothing and materials and allowed develop a classification of hospital garments. In such way the hospital clothing can be considered as a separate class of clothes. Design of which should be based on specific conditions of using to ensure comfort in realization patient's vital functions, holding the procedures and manipulation.

Therefore, an integrated approach to the development of hospital garments will largely satisfy the needs of patients, which generally contributes to improved quality of life of people living in difficult conditions.

6 REFERENCES

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