Consequences of the use of improper clothing for premature children

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The purpose of the research was to evaluate the process of dressing-undressing of two types of clothing used in a clinical hospital maternity. Twelve premature babies aged between 34-36 weeks were used in the study, while being examined by the medical staff. The premature babies were wearing two types of clothing: light clothing (body) or heavy clothing (pajamas, blouse suit and trousers). They were divided into two groups: children in the first group were dressed in ordinary clothes, and those in the second group were dressed in tailored functional products. This study is a first step in exploring the impact that two types of clothing have for the same category of prematurity group. In this context, clothing also represents a means of showing affection for the child, but at the same time it has the role of satisfying certain needs in terms of ensuring the optimal conditions for his/her care.
Keywords: *intensive care unit, premature children, adapted garments, physiological effects.*

1. Introduction

Every year, about 15 million babies are born prematurely (before 37 weeks of gestation completed) and this number is growing. The rate of premature birth varies from 5% to 18% of newborns. In the USA, the incidence is about 12% (with variations between 10% and 13% depending on the geographical area) with a steady growth trend of about 1% every decade over the last 40 years [1-5].

An important factor for growth and development is the clothing products intended for this specific group of wearers. Therefore, the correspondence with the functionnal and ergonomic requirements, and the inclusion of constructive and compositional features (shape, divisions, colour, decorative elements and style), must be taken into account when designing clothing for premature babies. Thus, compositional-constructive solutions can be proposed, based on the conditions of care and on the physiological and morphological features of children born prematurely.

Premature children hospitalized in an intensive care unit come into contact with a new technology, and medical rules and procedures. Due to the medical equipment, the premature baby has a much better chance of surviving. In the worst case, with minimal equipment, the premature baby can be heated and monitored with [6-9]:

– closed or open incubator;

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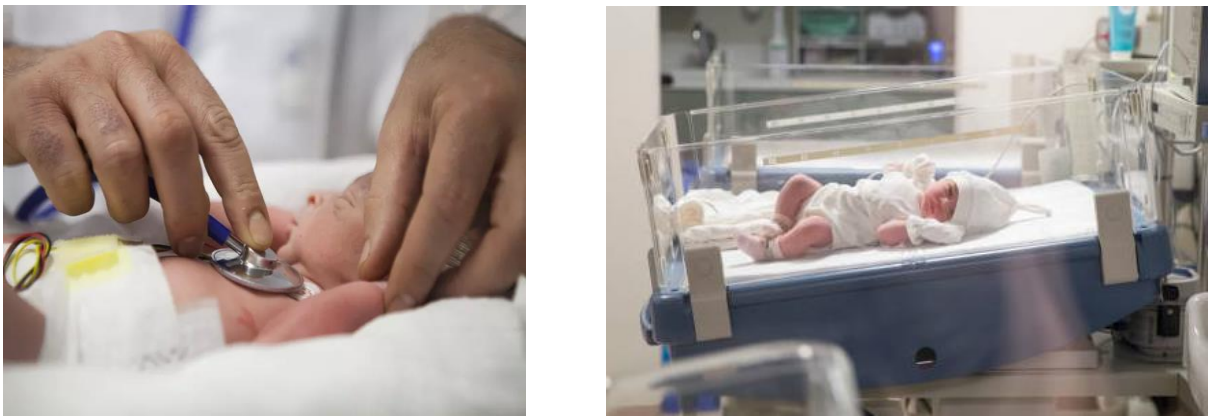

Fig.1 Premature children in the neonatal therapy

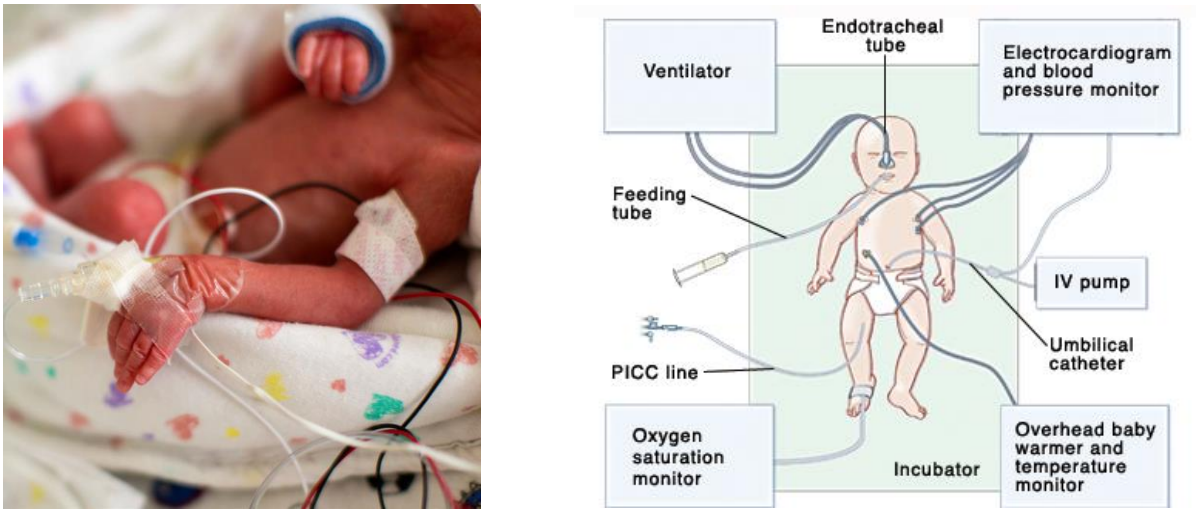

Fig.2 Positioning of the medical equipment

– thermometer for permanent monitoring of body temperature;
– cardio-respiratory system monitoring device for monitoring heart rate and respiratory rate;
– pulse oximeter, to monitor oxygen in the blood.

Subsequent care of the premature baby is provided in the neonatal intensive care units and at home. The care of the premature child must take into account the following principles:

– the therapeutic act is an emergency situation, and delays in correcting disorders that occur in vital functions can cause irreversible injuries, followed by death or secondary pathology;
– the therapeutic gesture can be harmful, and an intensive therapy applied on a fragile organism with reduced enzymatic potential, can cause an aggravation of the evolution;
– measures of care for the premature baby must be applied differently and must focus on the stages of the period of adaptation to additional uterine life, which have their own characteristics and pathology [7-11].

During the adjustment period, premature babies go through three main stages:

– the stage of immediate adaptation, which includes the first 3 days;
– the stage of early adaptation that lasts 3 - 10 days;
– the late adaptation stage, which begins after 2 weeks and lasts until full maturity.

2. Information

Premature babies are very small, compared to those born at term; they have low muscle mass and tone, which makes it difficult to control the movements. Without a positioning support, premature babies tend to lie with their arms and legs straight, with their head back and their back arched (extension). They also tend to move their arms and legs more and have difficulty calming down. One of the solutions to maintaining the child's body is the adapted clothing products. Specific clothing products (Fig.1) must be made of non-allergic materials, be easy to wash and fitted to medical equipment. They must provide optimal comfort, safety, security and protect the body from harmful factors,

and at the same time provide thermal insulation, aspects that are essential for clinical care.

The premature baby is also connected to a number of medical devices (Fig.2).

In order to help the little one feel more comfortable, it is necessary to develop textile products adapted to both medical devices and the specific requirements of this type of wearers. Finally, medical staff and nurses will be able to easily use the appropriate products by providing the little ones with proper care.

Infants can undergo a large number of painful and stressful but necessary procedures during their care. Children depend on others to recognize, evaluate, and treat pain and discomfort [10-15]. Pain and stress can be minimized by providing individual care by parents and nurses, and by wearing functional clothes appropriate to the child's development.

Although it is easy to find clothing products in stores and on websites, not all of them meet the requirements for every premature baby. The size, condition and medical equipment of a baby play an important role in the clothing worn by premature babies.

Among the clothing products recommended for premature babies can be mentioned:

- Hats: are a necessity in therapy, even for very young or very sick premature babies; head covering helps maintain a proper baby temperature.
- Diaper covers: even the smallest and sickest patients can have a coloured cover over the diaper.
- Boots: although it can be difficult to keep the boots on the child's tiny feet, they can be worn even by very young children with complex medical conditions.
- Suits/body: can be worn by stable babies, whose skin is fully developed.
- Jumpsuits/pajamas: these are great products for babies going from a warm incubator to an open crib.

Premature babies have sensitive skin and delicate respiratory systems, and strong odours or harsh chemicals can cause allergic reactions. Clothes for premature children should be washed in warm water, in a smoke-free environment, using detergent that does not contain perfumes or dyes. Laundry conditioners and drying sheets cannot be used. These types of products should always be washed before wearing to remove dust and to keep it clean.

3. Methods used

The basic requirements for clothing for premature babies in incubators are:

- functional and ergonomic; the products must have high functional properties so that the medical care staff can dress and undress the child in less than 1 minute, especially in medical emergencies;
- clothing products must ensure stable thermal insulation conditions;
- through constructive-technological solutions it must reduce heat loss by providing access to certain areas of the body, without the need to completely undress the child.

Attached medical device elements must not be affected by the handling of the medical personnel or the child's movements. Clothing should be tailored to the typical position of the premature baby, specific to the child's age and movements, the product size should be appropriate to anthropomorphological parameters, and closure systems and types of assembly should be simple and not traumatize the sensitive and immature skin of the premature baby. The positions of the arms and hands were different in terms of clothing: the babies in the second group (dressed in the functional adapted clothes) bent their arms more and kept their hands closer to their heads, compared to those who were dressed in regular products. Consequently, touch time is different, as self-touch is known to be an important way to calm down. Improper clothing can affect the self-calming behaviours of premature babies (newborns) who no longer have other forms of contact. The results suggest that more attention should be paid to the choice of clothing.

The characteristics of the subjects used in the study are presented in Tab.1.

Table 1: Characteristics of preterm infants and observations made

Characteristics (average values)	The first group of subjects (adapted functional products)	The second group of subjects (commercial products)
Gestational age at birth (weeks + days)	31+ 3	31 + 3
Birth weight (g)	1400	1450
Postnatal age (weeks + days)	35,5	35,5
Measured weight (g)	1890	2100
Duration per child when dressing-undressing	Average 78 s	Average 2 min and 52 s

The study was approved by the Institutional Ethics Commission and the newborns were included with the consent of their parents. The study was performed during care by medical staff or parents. The main characteristics of premature babies were weight and age. The premature babies were registered or observed during the care or during the medical procedures performed by neonatelogist or the head assistant.

The main benefits that can be offered by functional clothing products for premature babies are:

- Improved thermoregulation - babies feel better when they are dressed, because they do not lose heat as easily.
- Gluing the joint - parents tend to feel more comfortable around babies when they wear clothes like any full-term baby. They feel better getting involved in caring for their baby by changing diapers, warming up and keeping babies close.
- Less stress in the family - parents of premature babies who wear functional clothes tend to feel less stress around them. They interact more effectively with their babies because they care less about medical conditions and focus more on the baby.

4. Results and discussion

The subjects were observed in either of the following two situations:

- The first situation: each child was in an open, heated incubator, wearing a clothing product, and was in a flat diaper and surrounded by a support device (namely, bedding wrapped around the child to create a "nest").
- The second situation: each child was in a crib carrying clothes and they were assisted by their mother.

The children were dressed as follows (Fig.3):

- in adapted functional product, for 3 children who were in the incubator and 3 who were in the crib,
- in commercial product, for 3 children in the incubator and 3 children in the crib.

The products that were worn were the following: classic body product for children without functionnal elements, and premature body product with functionally adapted elements.

The observations were made for 2 months in the premature child care department. The time when the observations were made was between 9 and 10.30 AM, during the visit of the neonatologist and in the presence of the parents. The recordings were made using the phone. Each video has been processed and reviewed countless times to identify the movements that the doctor makes and how long the process of dressing and undressing the product takes, as well as the movements that the child makes during these procedures (Tab.1).

The periods of time required for the dressing-undressing process, performed by the neonatologist, were compared. As reflected in the data presented in table 1, the use of designed and adapted functional products substantially reduced the dressing-undressing time from 2 min and 52 s, to only 78 s.

In order to increase survival and contribute to the development and growth of premature babies, it has been scientifically proven that clothing plays an important role at this stage. Functional clothing also increases the degree of thermal insulation of the body by superimposing several layers of material on some parts of the body (Fig.3). They must correspond to the anthropometric characteristics of the premature baby and be made of natural materials. Clothing products should ensure comfort, skin protection, minimal injuries

a) b)

Fig.3 Child dressed in two different products: a) Premature baby dressed in commercial product and b) Premature baby dressed in adapted functional product

and prevention of infections, depending on the individual needs of the child. Improper choice of products can't insure comfortable positions for the child, or changing his posture during sleep; this require clothing that is loose enough to allow movement and safety.

5. Conclusion

The clothing models developed in the study are original and designed in accordance with the requirements of clothing for premature babies. The functional clothing products are made of natural materials, which will allow the baby's skin to breathe and will provide protection against various chemicals and pathogens.

Clothing products meet all the requirements and standards for the manufacture of clothing for premature babies with low body weight. Therefore, the functionality of the manufactured clothing products can be obtained using:

- structural elements for folding the front and rear elements;
- locking systems located on the ends of the products, by simply attaching staples or buttons;
- minimum types of stitches that do not scratch the child's skin.

Thus, the proposed clothing products allow easy access to:

- shoulder, chest and back for equipment control, neonatelogist intervention and for monitoring vital parameters;
- hand, by closing with the help of staples;
- foot, for the necessary equipment.

The side seams of the pants will free up the area needed for intramuscular injection, without completely undressing the baby, so that heat loss will be minimal. The use of functional structural elements on the side and lower seams of the shoulders will provide comfort and safety to premature babies, and will ensure the necessary care and handling without creating discomfort.

The functional-structural elements of the developed clothing provide access to the procedure areas based on the following main elements:

- adjustment method - changing the geometric parameters of the product, the type of "fixing-adjusting";
- wrapping the back and front elements, giving the possibility to undress easily without traumatizing the child and to offer help in a short time, in the case of neonatal emergencies;
- forms and dimensions adapted to the anthropo-morphological parameters of the wearer.

Opening certain parts of the product is convenient in medical procedures, because part of the body is released and the rest of the time is covered and protected from outside influences. The proposed functional and constructive elements are easy to use during intensive neonatal therapy, being a support for both children and medical staff. The method of "adjusting-fixing" the product can be used for premature babies according to the degree of prematurity and can ensure the correct adjustment of the sleeve, of the product, or of the length of the trousers. This type of morphological transformation is used, for example, to control the width of the trousers on the waistline, by folding, in the case of clothing with waist support. Staples are recommended as fasteners for this type of clothing, allowing easy and quick opening.

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