

## ***Designing Functional Apparel for Seniors With Chronic Physical & Mental Impairment***

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### **Abstract**

The United Nations “World Population Prospects 2019” global trend forecasts a decline in fertility and an increase in the ageing population, accompanied by body organs and cognitive levels declining with age, including the risk of dementia. The convenience of getting off clothes is important. Clothing is a basic human need, which is equally the case for physically challenged patients. The purpose of this research is to find a feasible way to offer those people an easy, less painful way to dress. To meet the special needs of these patients, the researcher evaluated three modest garments. In view of the complete structure of Taiwan's textile industry, providing 70% of global functional textiles, and in 2017, the researcher obtained the First Class Women's Clothing Technician Certificate. Through the testing process, the researcher assessed the needs and problems when wearing the clothing, and used functional fabric with breathable, antibacterial, water proof nursing, and odor-proof characteristics to design modest apparel to improve the comfort and convenience of patients. The researchers applied in-depth interviews and observations to collect data to understand factors missing in garment design. The researcher found that modest apparel is suitable for physically-challenged seniors who want independence and self-confidence in their lives.

Keywords: Ageing Impediments, Modest Apparel, Functional Fabric

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## **Chapter 1 Introduction**

### **1-1 Authoring Background**

Finnish Minister of Advanced Welfare Ilkka Taipale has said "People have to recognize that ageing is not just a health issue, it's a social welfare issue." Ageing is omnipresent.

"Ageing" is not simply the meaning of recession or disease, but a natural and necessary process. Population ageing is a global trend, and the World Health Organization (WHO) in 2002 put forward the concept of active ageing, which is defined as a process to improve the quality of life in the elderly and achieve the most appropriate health, social participation, and safety. When the health, social participation and safety of the elderly reach the most appropriate state, and the full social capital is accumulated, and the rich wisdom and experience of active life are absorbed, a strong force will be internalized to contribute to the benefit of the people.

For a meaningful and successful elderly life, the most important thing is to face and accept the facts of ageing in a positive and direct manner; to readjust and evaluate one's elderly activity in order to integrate the personal values and life objectives; and, to maintain personal self-esteem in order to maintain life's meaning and a state of comfort in the old age, is the source of its important way of life and happiness, while learning the active and open life of the elderly is also the key factor to achieve successful ageing (Chen Yanzhen, 2015, elderly welfare services).

### **1-2 Creation Motivation**

The United Nations World Population Prospects 2019 points to a global trend of declining fertility and a surge in older people over 65. The decline in global fertility and the increase in human life expectancy are the main factors of population ageing. In 2019, Taiwan entered an advanced age society in which Ageing & Gerontology have become a dominant trait. The body organs of the elderly are degraded, cognitive functions decline with the age increase, and the risk of mental retardation is increasing among elderly people with chronic diseases and physical and mental disorders.

In 2016, the researcher continued her doctoral program, and because ageing is a major movement of future national society and families, the researcher obtained a first class women's clothing technician's certificate, in 2017, believing more in aesthetic style and design, allowing the elderly to wear clothing and incorporate conscious concerns. Combining theory with practice is one of the research motives.

The development of elderly service market and industry has been rising with the improvement of social welfare system, the improvement of living quality, and the development of medical science and technology, so enterprises and governments have gradually attached importance to it. How to maintain the health and enjoyment of the elderly is a very important issue. The happiness of the elderly is not only an extension of life expectancy, but also possession of a healthy body and mind (Hong Lin Shumen, 2014). The elderly consumer market and derivative industries are the second motivation for research.

To satisfy the physiological and psychological requirements for convenience and functionality is the concern of the design. The design focuses on human activities and independently completes the wearing and detachment function of the clothes, which has the physiological requirements of aesthetic fashion, human function and providing for oneself in daily life. The design of suitable clothing structure is the third motivation.

### **1-3 Garment creation ideas**

1. This paper discusses the caring design of the elderly people with chronic diseases and physical and mental disorders. It is difficult for elderly people with chronic disease and physical and mental disorder to live in daily life. For example, when a wheelchair is used, how to allow clothing to be easily removed and suitably designed to allow patients with chronic diseases to be comfortable and live with dignity.

2. The study of the characteristics of functional fabrics allows elderly people with chronic diseases and physical and mental disorders, via functional textiles, to feel (inside) and exhibit (outside) confidence and once again plan their own life and existence.

3. Incorporating aesthetic style and design in an effort to enhance the mental care of older people when they dress. I like my profession, and creative design is to translate concepts and ideals into physical things that one can recognize and society can value.

## **Chapter 2 Literature Exploration**

### **2-1 Global trends-Aging population**

The World Health Organization (WHO) defines population ageing as a phenomenon in which the national population distribution is skewed towards higher ages. The ageing of the population is worldwide and has appeared more in developed countries; recently, it has also begun to emerge in developing countries. This trend is accelerating in developing regions, meaning that the elderly will be concentrated in developing regions. Fred Pearce, a well-known international scientific writer, pointed out in *The Great Shock of Population* (2012) that the 600m elderly people who live today account for 8% of the world's total population. As people live longer around the world, according to United Nations estimates, the total number of aged people over 65 will double to 1.1bn in the next 20 years, accounting for 13% of the population.

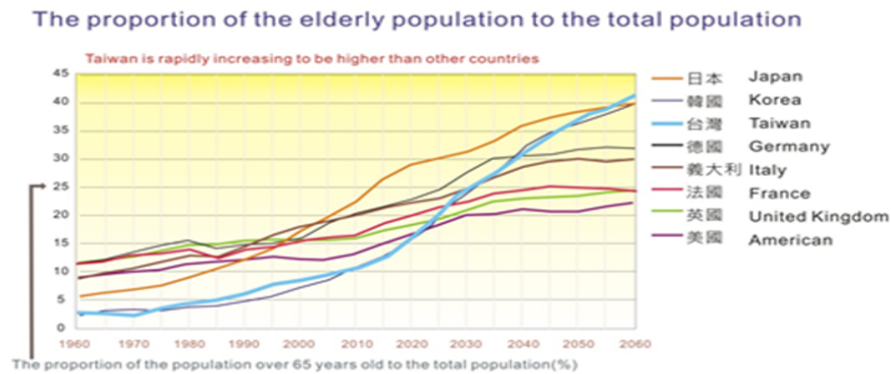


Figure 2.1 The proportion of the elderly population to the total population

Source: Republic of China National Development Council.

The graph is compiled and produced by the researcher.

Global ageing is accelerating, and Taiwan's ageing rate is also rising. The current figures show that Taiwan and South Korea have a lower proportion of elderly than the advanced countries, and the proportion of the elderly in Japan, Germany, and Italy is more than two times Taiwan's proportion. China became an ageing society in 1993 and is estimated to become an extremely old age society by 2026. The imbalance in population structure has been growing.

## 2-2 Taiwan textile industry

Taiwan's textile industry is based on the processing and export of imported raw materials and the establishment of factories to produce petrochemical raw materials, expanding artificial fibers and vertically integrating the continuous production system of upstream and downstream industries, including the manufacturing of human fibers, spinning, weaving, dyeing and finishing, garment and apparel products.

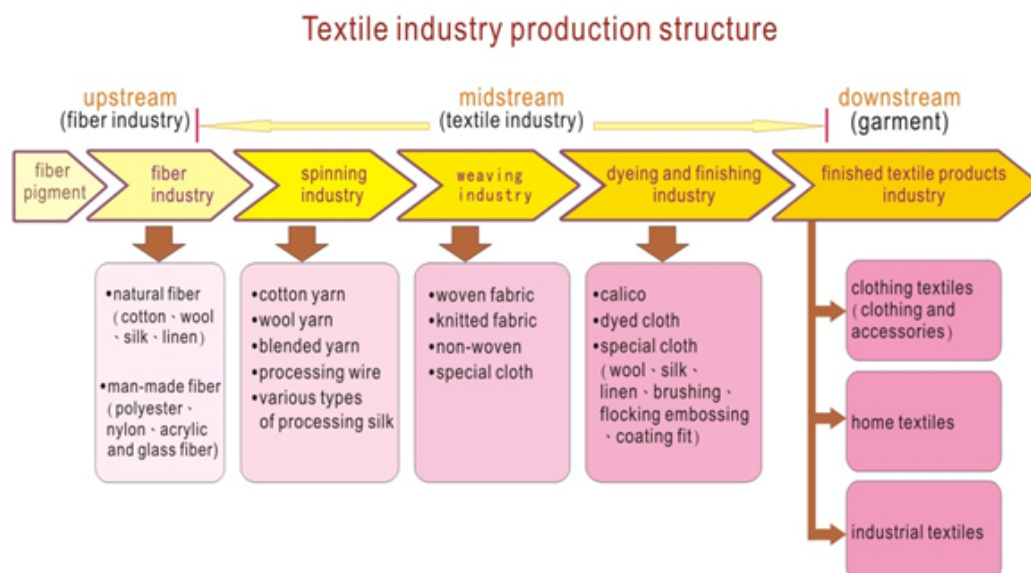


Figure 2.2 Textile industry chain

Source: Republic of China Textile Industry Development Association

The graph is compiled and produced by the researcher.

Since 1971, Taiwan's textile industry has been integrated upstream and downstream, with a complete industrial structure and a leading position in the world in terms of the output of synthetic fibers. Seventy percent of the world's functional textiles come from Taiwan. The textile industry in Taiwan is vertically integrated with a consistent upstream and downstream production system, which includes the manufacture of human fibers, spinning, weaving, dyeing, finishing and clothing. Clothing with comfort and technical functions in the future is the focus of Taiwan's textile industry to upgrade and enhance value.

### 2-2-1 Functional fabric

In response to the global extreme climate change and the issue of energy conservation and carbon reduction, consumers are increasingly paying attention to the quality and functionality of textiles. At present, the functional fabric industry has become the mainstream of the new generation of textile industry. "Functional Fabric" or "Performance Fabric" refers to the special processing of textile, which give it antibacterial, deodorization, ultraviolet (UV), moisture resistance, thermal insulation, anti-flammable, waterproof, wind proof, static proof and other functional uses, and can improve the added value of textile (World Web of Materials, 2019). In the 21st century, the development direction of the textile industry emphasizes ecology, environmental protection, health and safety.

**Efficacy classification table**

safety of life	health care
radiation protection, electro-magnetic wave , anti-static anti-flammable anti-UV material far infrared light storage	anti-fungal insect control anti-bacterial anti-mite /mosquito far infrared deodorant
comfortable life	smart function
sweat-absorbing moisture-absorbing moisture-permeable waterproof heat-insulating morphological memory fiber anti-fouling	physiological sensing conductive medical dressing woven shoes

Figure 2.2.1 Composite functional textiles

Source: Bpaper Good News, Issue 42, 2015.

This graph is compiled and produced by the researcher.

### 2-3 Ageing phenomenon

Physical and Mental Disorder, the term "physical or mental disorder" used by the World Health Organization, is defined as follows: A disorder is a general term, including injury, limited activity and participation. Injury is a matter of physical function or structure. Limited activities are the difficulties encountered by people in

carrying out their tasks or operations. The limitation of participation is the problem of participation in personal life.

According to the Ministry of Health and Welfare, in September 2019, 1.182m people were given physical and mental impairment certificates (handbooks), representing 5.01% of the total population (2018/4.98%), of which 55.84% were men, representing 5.64% of the total male population, compared with 4.39% for women. In terms of age, 35% of the 45-64 age group and 40% of the over-65s.

Chronic diseases are a persistent or long-term health condition or disease. The U.S. National Center for Health Statistics defines a chronic disease as a condition that lasts for more than three months, or is a permanent injury caused by an illness or a congenital condition. Common chronic diseases include malignant tumors, cerebrovascular diseases, heart disease, hypertension, hyperglycemia, diabetes, chronic liver disease and cirrhosis, nephritis, nephritic syndrome and renal lesions, arthritis, asthma, chronic obstructive pulmonary disease and AIDS. The proportion of Americans over 65 with chronic diseases approaches 75%. According to the Ministry of Health and Welfare's 2017 survey of the living conditions of the elderly, about 41% of Taiwanese people between 55 and 64 have chronic diseases, increasing to 65% for those over the age of 65, and the proportion of people with chronic diseases increases with age in both sexes. In addition to the increase in the proportion of people with chronic diseases, statistics from the Ministry of Health show that the proportion of people over 65 years of age with chronic diseases has increased year after year.

There are three main reasons for the dramatic increase in chronic diseases: the rapid growth of the elderly population, health risk factors (such as smoking) and insufficient physical activity. As the number of chronic conditions increases, the risk of a person's daily functional decline, hospitalization, or even premature death increases significantly. (US CDC data, 2018)

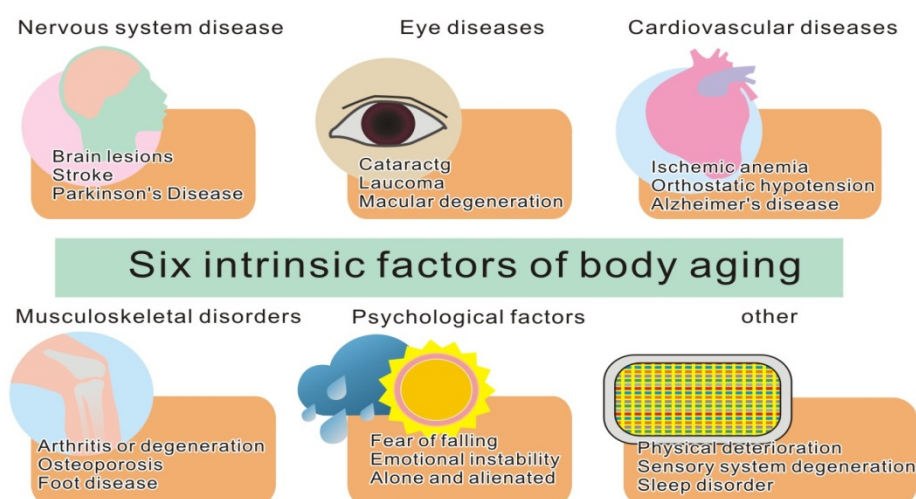


Figure 2.3 Six internal factors of body aging Source: Geriatrics  
This graph is compiled and produced by the researcher.



### Chapter Three Research Methods:

The researcher applied in-depth interviews and observations to collect data to understand the missing factors in garment design. Through observing the body shape and stature changes of elderly people aged 65, 75 and 85, the layout was designed to further understand the influence of body shape on the design direction of elderly people's clothing.

#### A. Changes in body shape of front, back and sides of 65, 75, and 85-year-old males

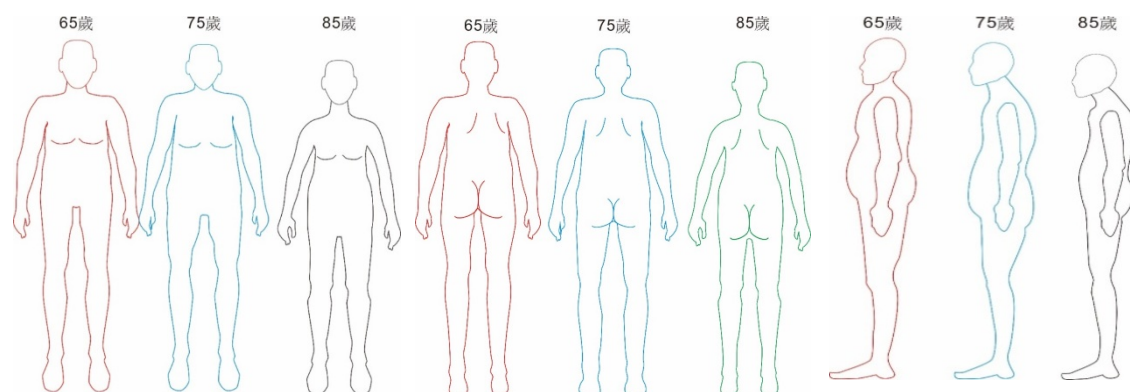


Figure 3.1 Changes in front, back, and sides of 65, 75, and 85-year-old males.  
Plotted in this study is compiled and produced by the researcher.

#### B. Changes in body shape of front, back, and sides of 65, 75, and 85-year-old females

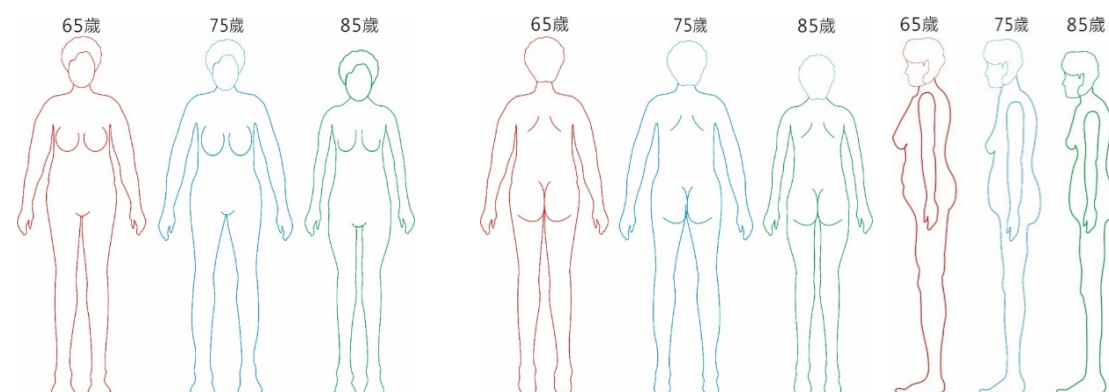


Figure 3.2 Changes in front, back and sides of 65, 75 and 85-year-old females.  
Plotted in this study is compiled and produced by the researcher.

In-depth interviews were conducted with elderly people with physical and mental disorders to improve or change the inconvenience in daily life clothing, and design the protective or adaptive clothing related to chronic diseases and related physical and mental disorders.

The chronic diseases and physical functions of elderly people make it difficult for patients to dress or put on clothing, affecting their opportunities and willingness to go out and interact with others. It is important to consider how to keep your clothes from being affected by illness and physical function, and to try to be as decent and generous as possible. The observation of the clothing of elderly people shows that

chronic diseases and physical disorders cause inconvenience to the existing body, and that clothing can help to improve the daily life capability/function.

How clothes can improve wearing inconvenience (e.g. stroke, loss of intelligence - limb disorders: wheelchair use, chronic diseases: urine bags, drainage devices).

Through in-depth interviews, the researcher clarified the chronic disease inconveniences and needs of the elderly, compiled the data, designed the related physical and mental disorders modest apparel (or adaptive clothing), and then, through the experimental method, made the related clothing in order to improve the psychological and physical comfort. The researcher found that adaptive clothing can help people with ageing disabilities gain independence and confidence in their lives.

Who can benefit from wearing modest apparel? including:

Special Need	Associated Problem	Adaptive Clothing Solution
Alzheimer's Disease	Individual disrobes at inappropriate times.	Locking Clothing
Oedema	Swelling of feet and legs leads to difficulty wearing conventional footwear or pants.	Adaptive Shoes and pants are adjustable in size and offer non-restrictive closures.
Incontinence	Reduced bladder control and urgency	Clothing that can be removed easily and quickly and can accommodate incontinence aids discreetly and comfortably.
Parkinson's Disease and Arthritis	Loss of fine motor skills	Buttons and zippers are replaced with easy touch Velcro or magnetic closures.
Contractures, Arthritis, Paraplegia, Quadriplegia	Inability to bend muscles or move joints	Open back clothing which allows the clothing to be put on frontwards, eliminating the need to bend or rotate muscles or joints.

The caring design of the elderly's modest apparel makes the wearer appropriately dressed and comfortable. First, understand the advantages and disadvantages of the body, adapt the advantages, and cover up and correct the defect. Second, pair the occasion with suitable clothing colors, and using bright colors, can increase energy, vigor, and delight. Third, use functional fabric clothing products to provide comfortable and flexible leisure clothes. The idea of "improving self-care ability" is



injected into the design. Based on the relevant theory of comfort and functionality of the garment, it will be an innovative functional design idea for the elderly garments.

## **Chapter 4 Creation**

### **4-1 Chronic Disease Clothing Design Series**

Alzheimer's disease (a disorder of the brain that causes memory loss and trouble with communicating), Parkinson's disease, and stroke are the three major diseases of the elderly, with significant health effects. The main symptoms are hand and foot trembling, stiff, slow motion, and unstable standing. According to a World Health Organization 2018 publication, Alzheimer's is the world's fifth leading cause of death, behind ischemic heart disease, stroke, chronic lung obstruction, and lower respiratory infections. Among high-income countries, Alzheimer's is even third (Qiu Mingzhang, Tang Liyu, 2009, Guideline for Care of Mental Retardation (unpurified water culture)), and Alzheimer's is the most common disorder.

Clothing for adults with special needs, who may need to help themselves or their caregivers dress. Anyone with special needs can meet their suitability. For those with special needs, wearing a simple T-shirt can help make it easy. By using the antibacterial deodorization cloth and the metabolic activity of the micro organs generated by the antibacterial agent, the proliferation of the cells, the growth of the odor cells and the formation of the odor on the textile can be inhibited, so that the wearer can experience a comfortable and healthy life.

The application of light reflection safety material requires a loose or telescopic relaxation design when meeting the activity can also improve the suitability of the clothes, can enhance the visibility of the wearer in the bad sight conditions or critical situations at night, and reduce risk.

Modest apparel design A.  
Chronic Diseases Clothing Design Series: One-Piece Top



Creative ideas:

This series is designed for stroke hemiplegia patients with arm disability and movement disorder.

For the design of the clothes for the disabled, caring design, the focus of solving the problem is how to use the healthy single hand to complete taking off the clothes.

The designer applies the PTFE/PU composite film bonding technology to fabric with water proof and moisture permeability.

The collar seat is matched with the sharp angle upper and lower collar of the 1970s style and the clothes body is designed in different colors; the clothes are in a piece structure; the opening of the clothes is arranged on the left side (opposite to the same); the pocket of the left front slice is extended with a belt which uses the activity of the left upper limb to finish putting on the clothes.

The adjustable length of the sleeve is designed for the wheelchair user to avoid the influence of hook movement, the sleeve is not too big or too long, and the width of the back is slightly larger than the width of the front chest in the clothing structure.

The length of the back is shorter than the length of the front sheet, the friction of the back coat pendulum is reduced more than the cloth, the modified design and the hidden additional parts are helpful for the people with the wearing difficulties to more easily carry out the self-wearing and the garment has a moisture-proof and water-proof safety protection function.

Modest apparel design B

Chronic Diseases Clothing Design Series: Wheelchair pants for lower limb care



Creative ideas:

These pants are designed for stroke, spinal cord injury and wheelchair patients.

In the design of the wheelchair patient, the opening and closing mode of the front side can prevent the user from affecting the wearing and disengaging performance due to the narrow space of the chair surface of the wheelchair. The invention takes into consideration the pulling of the waist, the hips and the knees, increases the design of the relaxing amount of the trousers and the appropriate loosening amount of the thigh, reduces the stacking fold when keeping the sitting position, reduces the drawing of the cloth of the knees and the hips, and, increases the overall appearance of the front, the side, and the back of the trousers.

When observing and caring for the wheelchair bound, because the lower limb is unable to lift the legs, the patient is not accustomed to placing the feet on the pedal, the invention is designed to add an annular band at the thigh and the lower leg. The band can conveniently be used to lift the feet to the foot pad by a hand, so as to prevent the feet from being dragged and injured on the ground. The invention is characterized by: the design of a loose belt is applied to the back waist of the trousers; the cloth at the opening of the trousers is connected with the waist of the trousers by a Velcro patch; the Velcro patch can enlarge or reduce the waist of the trousers according to the requirements, avoiding zipper and the button complications.

The functional professional surgical cloth (Ever Surgical Textile Level 3) uses the PTFE/PU composite film bonding technology, so that the wearer has waterproof, moisture permeable, soft and static-proof safety functions.

#### **4-2 Apparel Design Series for Physical and Mental Disorders - Mouth-making apparel and cancer**

In the 2009 “White Paper on Health 2020,” the Ministry of Health and Welfare of the ROC Executive Yuan listed the health protection of the handicapped as part of the national health policy for the first time (Wang Kuo-yu, 2008). According to the Survey of Living Conditions of Persons with Physical and Mental Disorders conducted by the Ministry of the Interior and the Labor Council of the Executive Yuan (2013), from 2011, physical and mental disorders accounted for 35.58% of the largest proportion of the categories in China.

What is Colostomy? During the operation, a portion of the colon or rectum is cut off, and the end of the colon is sewn on an opening in the abdomen, thus becoming a colon-shaped mouth (false anus). Because the incision is sewn on the abdomen, it does not contain a sphincter to control the excreta, so the feces can be directly discharged out of the body at the colon incision. Patients themselves do not feel the ejection, nor can they control their discharge, so they need to put a pocket in the location of the mouth to collect feces (Colostomy care).

When designing clothing with an opening for Colostomy care, it is particularly necessary to pay attention to the common problem of skin sensitivity, because the following conditions can cause inconvenience in wearing clothing: being allergic to mouth material and the feces often contacting the skin. The invention adopts the following characteristics: use of antibacterial cloth; the shirt-style simple

manufacturing style; the left front sheet retains more cloth; the upper sheet and the lower sheet are made into detachable clothes body for cleaning the mouth; a hidden mouth-making pocket is designed; the mouth-making pocket is safely stored; the mouth-making weight of the patient is reduced; the growth of bacteria and fungi is controlled, the smell of disturbing people is eliminated; and, the confidence and dignity of the patient are increased.

The wound drainage tube bag can be arranged in the pocket which is specially designed in the interior of the clothes, and can move along with the wound part and change the size of the drainage tube bag, so as to avoid pulling and sliding of the drainage tube. The present invention can restore the social function of the patient and reduce the patient's sense of disease. The design allows a cross valve urine release switch of the urine bag to leak the urine from the skirt, skirt, and skirt without taking the urine bag out. The design allows the urine to be removed from the skirt, skirt, skirt, skirt, and skirt. Urinating bags are also a constraint, and clothing design promotes the idea of zero-constraint care, so that old people get sick and still have dignity and security.

#### Modest apparel design C

#### Chronic Diseases Clothing Design Series-Multifunctional Postoperative Care Clothes



#### Creative ideas:

The dress is designed for the patients with the drainage bag of breast cancer after operation, a large intestine cancer pocket, and a urine bag.

The body was cut in a fit, showing an obvious waist, and showing the woman's graceful posture. The colors are diverse, light pink, light yellow, dark green, light blue, and the style is no longer a simple "robe-and-vest" style, with a separate jacket and trousers, a wrapping suit and a shirt suit. The colorful patient clothes not only make the cold and ice ward more warm, but also make the clothes pleasing to the eye and convenient to wear.

The shirt-style dress has simple and special charm by using the moisture-permeable water-proof composite film to fit the cloth; the skirt wave cutting and expanding design is to increase the circumference of the skirt pendulum, so that the body has a larger movable space in the skirt; the length of the skirt is designed above the knee, which is in line with the human engineering. The upper body is sewed to fit the garment, the shirt is deconstructed and layered, and although the tradition is broken, clear and identifiable elements of the shirt are retained, and the body, the sleeves, and the collar are cut in different colors. An opening is formed at the front chest along the collar and shoulder, which is convenient for patients needing intravenous injection treatment. The opening at the side of the sleeve makes the patients with drips more convenient to wear and remove, thus reducing the trouble for nursing personnel. The patients with a drainage pipe on the body can place the drainage bag in a hidden drainage pocket at the inner side of the waist, and the hidden drainage pocket can be adjusted with the condition of the patients.

The hidden urine bag of the seam on the inside of the skirt solves the problem that the patient needs to carry the urine bag when moving, and the urine guiding tube and the urine bag with the urine are exposed to the outside, thus causing the patient to feel awkward.

## **Chapter 5: Conclusion**

Ageing, like every process of life, is confusing in the moment and hard to define, a natural journey of life, but a disturbing one in modern society.

In the past, people have had more time left after retirement, but the risk of mental disorders is rising in the face of significantly extended old age, physical organ degradation, cognitive decline with age, chronic diseases and physical and mental disorders of elderly people. According to a survey conducted by the Ministry of Health and Welfare in 2017, the number of people aged 65 and over with chronic diseases, such as arthritis, dementia, heart disease, cancer and diabetes, increased by 65%, with both men and women having increased maladies with age. The Dementia Association's Prevalence Survey shows that the proportion of the elderly is also increasing year by year, and will become larger over time. According to a study of mental development for 18,000 people aged 20-76, 34% were dependent, 56% were independent, and less than 10% were successful in switching into symbioses.

The researcher, who obtained a First Class Women's Clothing Technician Certificate in 2017 and incorporated aesthetic style and design to allow older people to consciously pay attention to the clothes they wear. The convenience and functional design that meets the physiological and psychological needs is called caring design. This paper discusses the caring design of clothes for the elderly with chronic diseases and physical and mental disorders. It is difficult for the elderly with chronic diseases and physical and mental disorders to live in daily life. For example, when the wheelchair is used, how to make the clothing easy to wear or adapted to assist those with chronic disease, so that the elderly can live with dignity. The study of the characteristics of functional fabrics allows elderly people with chronic diseases and physical and mental disorders to pass through the function of clothing, enables them to feel more confident about their lives, and helps them once again rediscover their meaning of life.

The third act of a drama is where the climax lies. From the beginning, the middle, the end...How to live a solid, wonderful life? How is life's happiness defined? How to pursue the goal? Living a happy old age. Because our bodies may degrade or disappear over time, but the spiritual level is always upward, and the inability to reconcile physical and psychological development is the greatest challenge we face in our ageing process. Life is not about ageing, it is about living, it is about living well.



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