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ANALYSIS OF THE INNOVATION POTENTIAL IN DRESSINGS TO TREAT CHRONIC WOUNDS IN THE CITY OF LIMA, PERU

ANÁLISIS DEL POTENCIAL DE INNOVACIÓN EN APÓSITOS PARA TRATAR HERIDAS CRÓNICAS EN LA CIUDAD DE LIMA, PERÚ

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ABSTRACT

Objective: Analyze the potential for innovation in dressings to treat chronic wounds in the City of Lima. **Methods:** A qualitative study was carried out by means of interviews to medical experts and purchasing managers of medical supplies for the treatment of difficult-to-resolve wounds in eight representative public health institutions with categories 1-4 within the only 54 of Lima, Peru - 2018. **Results:** It was determined that an average of 17 patients is treated in public health institutions on a monthly basis (60% from hospitalization and 40% from an outpatient office). It is equivalent to say that 11,016 patients present chronic wounds each year, which will require specialized treatment and an average annual demand of 110,160 dressings in stock. The dressings with the highest demand correspond to the Hydrogels and Hydrocolloids, respectively. They are used because of the positive results they offer in wound healing, despite economic limitations. The market price per unit ranges between 20 and 90 soles (PEN), representing an economic investment of 1500 soles on average per patient, in some cases causing complications or abandonment of treatment when resources are scarce. **Conclusion:** There is a high demand from patients with chronic wounds of difficult resolution in the public health institutions of Lima. It is important to promote and incentivize the investigation of new therapeutic alternatives and / or biomedical devices that favor its treatment.

Key words: Chronic wounds; Injuries; Dressings; Bandages hydrocolloid; Hydrogels; Plastic surgery; Innovation (source: MeSH NLM).

RESUMEN

Objetivo: Analizar el potencial de innovación en apósitos para tratar heridas crónicas en la Ciudad de Lima. **Métodos:** Se realizó un estudio cualitativo mediante una encuesta y análisis de las entrevistas realizadas a expertos médicos y gestores de compras en insumos para el tratamiento de heridas de difícil resolución en 8 instituciones representativas de salud pública con categorías 1-4 dentro de las 54 existentes solo en Lima Metropolitana, Perú-2018. **Resultados:** Se determinó que en las instituciones de salud pública son atendidos un promedio 17 pacientes mensualmente (60% provenientes de hospitalización y 40% de consultorio externo). Equivale decir que 11,016 pacientes presentan heridas crónicas de difícil resolución al año, los cuales requerirán de tratamiento especializado y una demanda anual promedio de 110,160 apósitos en stock. Los apósitos con mayor demanda corresponden a los Hidrogeles e Hidrocoloides, respectivamente que son utilizados por los resultados positivos que ofrecen en la curación de las heridas, aunque en ocasiones la limitante es el aspecto económico. En el mercado, el precio unitario oscila entre los 20 y 90 soles, esto representa una inversión económica de 1500 soles en promedio por paciente, produciendo en algunos casos complicaciones o abandono del tratamiento cuando los recursos son escasos. **Conclusión:** La demanda de pacientes con heridas crónicas de difícil resolución en las instituciones de salud públicas de Lima metropolitana es alta. Es importante promover e incentivar la investigación de nuevas alternativas terapéuticas y/o dispositivos biomédicos que favorezcan su curación.

Palabras clave: Heridas; Lesiones; Apósitos; Vendas hidrocoloidales; Hidrogeles; Cirugía plástica; Innovación (fuente: DeCS BIREME).

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INTRODUCTION

After a skin injury, the loss of continuity that occurs can compromise skin, subcutaneous tissue, muscles, tendons, nerves, bones and internal organs, depending on their severity[1]. Healing rates range between 21 and 35% and the rate of recurrence of the lesion is high, which results in a higher occupancy of hospital beds, excessive spending on treatments and negative repercussions on people's quality of life[2].

From an economic point of view, the trade of wound care products is estimated to be between 15 to 22 trillion dollars by 2024[3]. In Europe, 1.5 to 2 million people who have access to their health system, present this type of injury[4]. In Peru, the figures are not yet clear due to the limited information.

Injuries involving soft tissues altering the vascular bed, independently of its extension and depth, increase the complexity when establishing a treatment protocol that optimizes the time for formation of granulation tissue to achieve an effective closure in first or second intention[1]. (Table 1).

Table 1. Origin of the wounds and their characteristics.

Origen	Aetiology	Affected Area	Treatment
Traumatic	Accident Traffic	Skin, Subcutaneous cellular tissue, muscle, tendon and bone	Fracture reduction, surgical cures, grafts, simple and / or complex flaps, amputation
Vascular	Insufficiency chronic venous	Skin, subcutaneous tissue	Rehabilitation, vascular treatment specialized, surgical cures, grafts, simple and/or complex flaps
Diabetic Foot	Neuropathic	Skin, subcutaneous tissue, soft tissue debris and bone compromise occasions	Surgical cures, rehabilitation grafts, simple and / or complex flaps, amputation

Source: Hernández I .; Rossani G .; Alcolea J.M .; Castro-Sierra R .; Pérez Soto W.; Trelles M.A. Pratical use of autologous fibrin in distribuive medicine and plastic surgery. Cir. plast. iberolatinoam. Jul / Sep 2014. vol.40 no.3.

Current Clinical Guidelines recommend treatments that can be bloody, expensive or lengthy including acute surgical debridement to promote revascularization, infection control, negative-pressure for diabetic foot and ulcers pressure, and compression suitable for ulcers venous[5,6].

In clinical practice, an attempt is made to create an environment conducive to wound regeneration through the application of a variety of dressings (Figure 1) based on alginate, collagen, fatty acids hyper oxygenated, hydrocolloids, saline hydrogels, silver, polyurethanes in film presentation thin, polyurethanes in foam presentation, silicone and hyaluronic acid[7,8].

Due to the above mentioned and the current problems in clinical practice and administration in different Peruvian health institutions, the authors considered important to analyze the potential for innovation in dressings for the treatment of chronic wounds in the city of Lima in Peru.

METHODS

A qualitative study was carried out using a survey and analysis of interviews in the Metropolitan area of the city of Lima, Peru. During 2019, the interviews were performed to surgeons of the specialty of plastic and reconstructive surgery, geriatrics, nursing staff specialized in chronic wounds and purchasing managers from eight representative institutions from a universe of 54, including health institutions with hospitalization beds and offering most surgical specialties in Metropolitan Lima. These institutions have an average of 17 people being hospitalized and attending outpatient clinic to treat their chronic wounds.

Taking as a conceptual framework, the concept of a difficult-to-resolve wound, the healing process of a wound and the factors that determine the complexity of wound healing, the interviews sought to know what problems were present in the treatment of wounds due to clinical and logistic or administrative issues, as well as the current level of interaction with the patient.

The interviewees consented to the use of information provided under the supervision of the Research Ethics Committee for Life Sciences and Technology of the Pontificia Universidad Catolica del Peru.

RESULTS

The interviewees were selected from 8 different health institutions of the city of Metropolitan Lima in Peru. The results of the interviews indicate that there is an average of ten hospitalized patients and seven patients per outpatient clinic being treated for chronic wound monthly per institution. This is equivalent to saying that, in the specialized public sector of Lima around 11,016 patients are treated for chronic wounds that are difficult-to-resolve, from which the 60% are hospitalized and 40% are treated as ambulatory patients.

The interviewees stated that on average for the treatment of difficult-to-resolve wounds, they require an average of ten dressings per patient per month, which means an estimated monthly demand of around 9180 dressings, and around 110,160 per year within public health institutions in Lima.

We found that in Lima public health institutions use dressings such as: Thin Film Dressings, Hydrocolloids, Surgical Foams, Hydroactive dressings and Hydrogels. Being the Hydrogels e Hydrocolloids, respectively, the most used because of the positive results they offer in healing injuries, although sometimes there are economic limitations to their use. The unit price in the market ranges between twenty and ninety soles (PEN), which represents an economic expense of 1500 soles on average per patient with this type of wound, which may limit patient treatment adherence (Table 2).

The problem that was repeatedly encountered by the experts was the bad smell that these types of wounds elicit and the number of treatment sessions required since chronic wounds consume a high amount of time dedicated to each session. In this sense, it would be beneficial for their daily practice to be able to decrease the number of cases or reverse the amount of follow-up sessions per patient; otherwise, they would end up being attended by poorly specialized health personnel.

It should be noted that the market in which we have studied these needs, it is characterized by institutions with poor management or lack of resources and low number of specialists who do not have decision-making power to choose the materials and medical devices to use and simply use what that they find at their disposal. In the public sector, the doctor is the one who makes the decisions for use, but the purchase decision is usually alien to most specialists who are not members of the purchasing committee.

Consequently, two axes were identified that allow segmenting the types of doctors that treat patients with chronic wounds. One axis deals with the level of participation in research performed by the doctor, the other axis with the institutional resources available for treatment. These axes segment four types of doctors led by the proactive and revolutionaries, who participate in decision making processes. Also, they share their best experiences and participate in the development of medical research.

This segmentation allowed us to establish their needs and based on them; evaluate strategies to address them per segment by establishing the profile of the first ones to adopt innovative developments. (Figure 1).

Also, we were able to identify the properties that should have an ideal dressing according to the appreciations of the interviewees. The highlighted characteristics are: High fibrinolytic capacity, good moisture control, absorbable capacity and reduction of the bad smell. Altogether, this would have a positive impact on treating chronic wounds by decreasing healing time, social impact and a reduction of hospital costs.

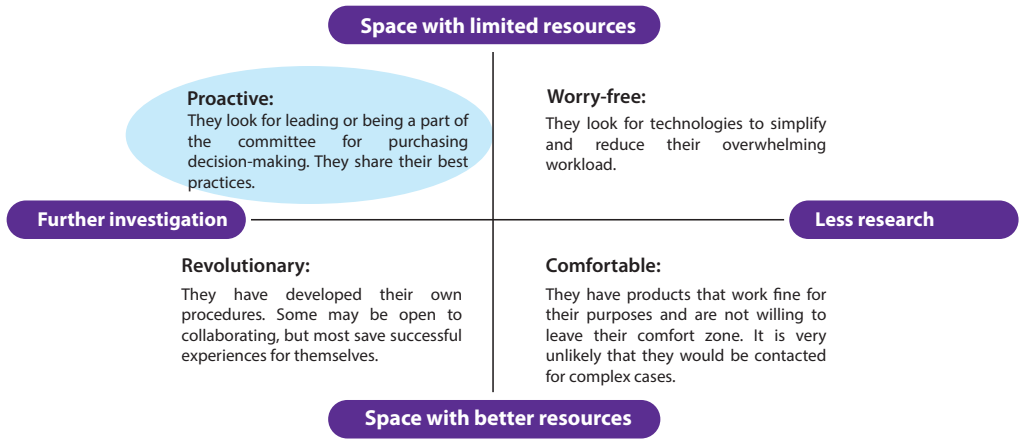

Figure 1. Segmentation of health personnel according to access to resources and interest in research new products.

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Table 2. Main products used in the treatment of chronic wounds in health public institutions of Lima, Peru.

Dressings	Thin (Film Dressing)	Used in superficial and clean wounds. In the prevention of pressure ulcers. In post-surgical wounds or later. These dressings consist of a thin polyurethane membrane coated with a layer of acrylic adhesive.	Less complexity ↓
	Hydrocolloids	Used in wounds with low or moderate exudate. These dressings are composed of polymers in a fine suspension and sometimes contain polysaccharides, proteins and adhesives. Upon contact with the wound of the polymers mix with the exudate and form a gelatinous mass.	
	Foam (FOAM)	These polymer dressings have different layers with an adhesive surface and a repellent outer the water. They are similar to hydrocolloids but Instead of forming a gel, the exudate is absorbed by the dressing maintaining a moist environment.	More complexity
	Hydractive	Hydrogels with a group of organic polymers with high water content, in which they tend to expand. It has the property of rehydrating the tissue while absorbing some of the fluid. They are presented in film or gel form.	

DISCUSSION

Treatment of chronic wounds arising from diabetes, vascular insufficiency, peripheral neuropathy, among others, require special attention to the demand for dressings to treat patients since they are within the National Health Priorities for the period 2019 - 2023[9].

According to the interviews, the demand for patients with chronic wounds of difficult resolution in the different public health institutions in the city of Metropolitan Lima in Peru is high and complex.

In our setting, most of these patients are not properly nourished or have comorbidities that hinder their healing processes. To promote granulation, the most requested dressings correspond to hydrocolloids, used in low to moderate exudate wounds, and whose polymeric constituents upon wound contact, mix with the exudate forming a gel. Unlike hydrogels, these are used in deep wounds to hydrate the tissue while absorbing part of the fluid[10].

Hydrocolloids and hydrogels help resolve the frequently mentioned bad smell issues of the wounds, and considerably reduce the amount of healing time that the chronic wound requires to properly heal. In addition, they allow a better control of time and logistics consumed in each therapeutic session[10].

The main limitations are concerning the needs, lack of resources and numbers of specialists who do not have direct decision-making power over the products required in hospitalization services and outpatient offices. It is important to observe what happens in other countries, where decision makers within the framework of this problem, are taken into account and is not restricted only to the specialized medical professionals, and also take into consideration to realities of wound management units, nurses specialized in wound treatments, economic consultants, and commercial references, among others[11].

In relation to the human resources and the axes found, it is important to segment each group well and investigate more deeply the characteristics of their behavior[12]. In this way, motivational actions may be taken to incentivize an attitudinal change to join forces, which would result in a positive effect when working as a team in this difficult terrain of the treatment of chronic wounds that end up consuming valuables resources.

That is why it is important to have proactive doctors,

that, being in an institution with the characteristics mentioned above and limited resources, can develop based on their experience new protocols based in medical research with the characteristics required: High fibrinolytic capacity, good control moisture, absorbable capacity and reduction of bad smell.

It is a new field in the country, which means there are no leaders and the market is divided by the different existing commercial products; however, it is the hydrogels that are beginning to position themselves in this market. The problematic scenario described at the clinical level between the time for interaction with a patient and the quality of health services management evidence the need to innovate in the treatment of chronic wounds.

This would have a positive impact on the treatment of chronic wounds by decreasing time healing and reducing hospitalization costs. All of this would mainly benefit the patients who usually have economic limitations and cannot afford the cost of dressings, as well as the time they spend attending to treatments and lost opportunities to work.

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CONCLUSION

Demand for patients with chronic wounds difficult to resolve in health institutions of Metropolitan Lima is high and complex. This global health problem represents an important burden for health systems, depleting health resources. It is important to promote and encourage research and innovation of new therapeutic alternatives and / or biomedical devices that promote their healing.

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