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HANDING DOWN AND ADAPTION: THE CONSTRUCTION OF THE MATERIAL WORLD OF HEALTH CARE TECHNOLOGY IN SPAIN (1855-1955)

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ABSTRACT: This historical study uses qualitative methods to analyze and describe the components of the material world of nursing care in Spain between 1855 and 1955 based on the analysis of eight nurse training manuals. A total of 360 objects and 45 procedures were recorded. Manual analysis was carried out concurrently with data collection based on the Grounded Theory approach. Findings show that the material world of health care was composed of objects that were handed down by the medical profession to health care professionals and adapted objects, improvised mainly out of everyday household items. While the handing down of medical tools and instruments could be said to be a theoretical and technical achievement, it is not clear whether it was also a scientific accomplishment. The improvisation of objects out of everyday household items promoted by the manuals highlights the artisan-like and ingenious nature of nursing practice, which should be explored further in future studies to provide a greater understanding and promote the recognition of these objects as a health care technology.

DESCRIPTORS: Nursing history. Biomedical technology. Working environment. Qualitative research. Spain.

HEREDAR Y ADAPTAR: LA CONSTRUCCIÓN DE UN MUNDO MATERIAL-TECNOLÓGICO PARA LOS CUIDADOS EN SALUD EN ESPAÑA (1855-1955)

RESUMEN: Estudio histórico que utiliza técnicas cualitativas, cuyo objetivo es describir y analizar componentes del mundo material para los cuidados en España entre 1855 y 1955, reflejados en manuales de formación profesional de la época. Se estudiaron ocho manuales completos, se registraron 360 objetos y 45 procedimientos. El análisis fue concurrente con la recolección de información, siguiendo procedimientos de la Teoría Fundamentada. Los resultados muestran que el mundo material para los cuidados estaba formado por objetos heredados de la práctica médica y objetos de carácter doméstico adaptados. Así, mientras la herencia de objetos de la práctica médica podría representar una conquista teórica y técnica, no está claro si también científica. La adaptación de objetos terapéuticos, a partir de cosas corrientes que los manuales promovían, indica un trabajo artesanal e ingenioso de los profesionales del cuidado que estudios posteriores podrían ampliar y contribuir a su reconocimiento como tecnología para cuidar.

DESCRIPTORES: Historia de la enfermería. Tecnología biomédica. Ambiente de trabajo. Investigación cualitativa. España.

HERDAR E ADAPTAR: A CONSTRUÇÃO DE UM MUNDO MATERIAL-TECNOLÓGICO PARA OS CUIDADOS EM SAÚDE NA ESPANHA (1855-1955)

RESUMO: Estudo histórico que utiliza técnicas qualitativas com objetivo de descrever e analisar os componentes do mundo material para os cuidados na Espanha entre 1855 e 1955, expressos nos manuais de formação. Foram estudados oito manuais para formação de profissionais do cuidado. Registaram-se 360 objetos e 45 procedimentos. A análise foi simultânea à coleta de informação, seguindo os procedimentos da Teoria Fundamentada no Dados. Os resultados mostraram que o mundo material dos cuidados estava formado por objetos herdados da prática médica e objetos de caráter doméstico adaptados. Assim, enquanto o legado de objetos da prática médica poderia representar uma conquista teórica e técnica, não está claro se também científica. A adaptação de objetos terapéuticos a partir de coisas comuns que os manuais promoviam, indica um trabalho artesanal e engenhoso dos profissionais do cuidado, que estudos posteriores podem ampliar e contribuir para o seu reconhecimento como tecnologia para cuidar.

DESCRIPTORES: História da enfermagem. Tecnologia biomédica. Ambiente de trabalho. Pesquisa qualitativa. Espanha.

INTRODUCTION

The material world of nursing practice is integrated by objects in movement that have varying meanings according to the society in which they are set.¹ The technology of the material world of care-giving practice has changed over time, as has the nursing profession. However, throughout the history of Spanish nursing, the meanings and symbolism surrounding the material world of care-giving practice have not been scrutinized, and the role of technological objects in nursing and the status of the profession has not been explored or sufficiently recognized. This article explores the material world of care-giving in Spain between 1855 and 1955.

Though a relatively new concept associated with Modernism, technology has always existed and it may be considered as any instrument used to satisfy human needs.¹ Technology is therefore a way of naming the material world and the objects, tools and instruments created and used by people in all types of activities.² It is the underlying purpose or intention of use of an object that makes it technology and gives its meaning within a given context.² Objects have therefore played an important role throughout both the history of civilization and the history of nursing.

Care-giving technology is implicitly recognized in the vast historiography of Spanish nursing and the material world of health care. Different studies have focused on the contributions made by religious orders to the professionalization of Spanish nursing.^{3,4} A study about the *Hijas de la Caridad* (the Daughters of Charity)³ focused on the theoretical content of nurse training manuals and the physical, moral and intellectual attributes expected of nurses in the early nineteenth century, suggesting that changes in medicine, technology and science had repercussions throughout the profession.³ A study regarding the knowledge and practices of the *Orden de los Enfermeros Pobres* (the Poor Brothers Infirmarians), founded by Bernardino de Obregon in the sixteenth century,⁴ shows that, although the use of instruments in the procedures described by the Order is implied, instruments are not specifically mentioned; while another study only mentions the stock of dental care instruments most used by bleeders and care practitioners in the eighteenth and nineteenth centuries.⁵

Other studies show the use of household objects by nurses, such as spoons, plates and cups,⁶ and the pitcher has been historically described as a tool for feeding the sick in both domestic and health settings.⁷ However, household objects are not considered here as technology, and their use by nurses in the world of nursing practice and how

this influenced the profession has not been studied in depth. Thus, the material world of nursing has been generally overlooked in the literature.

An exception to this rule are present-day critical or intensive care units. The impact of these units on the nursing profession has been the subject of a number of investigations, historical studies and reflections on the discipline and practice of nursing.⁸⁻¹⁰ Numerous studies have been undertaken in Spain regarding the work and experiences of nurses in intensive care units.¹¹ Although studies concerning the historical evolution of these units in the country do not exist, recent research focuses on modern intensive care unit facilities and technology, and the health professionals dedicated to care delivery in these settings.¹²

Some historical works concerning Spanish nursing recognize the influence that different types of training and health care practices among care practitioners and nurses - both doctors' assistants in the nineteenth and twentieth centuries. Care practitioners, who generally had broader training and technical skills, gained greater prestige and social recognition than nurses, whose training was more natural, vocational and feminine.¹³⁻¹⁴ However, little is known about the role that objects played in this process. Therefore, an exploration of the material world of health care throughout the history of nursing and nursing technology may help provide a deeper understanding of key issues facing the nursing profession.

This article presents the results of a broader study that has resulted in other publications¹⁵⁻¹⁶ and whose question was: what was the material world of health care like in Spain between 1855 and 1955? The aim of this broader study was to contribute towards the knowledge of the use of nursing care tools and instruments in Spain between 1855 and 1955. The aim of the present study is to identify these health care objects as elements of the material world of nursing care and recognize the use and transformation of everyday objects for care-giving during the period in question.

METHOD

This is a historical study that uses grounded theory procedures to sample and analyze data.¹⁷⁻¹⁸ The past cannot be explained, but must rather be understood; thus, the present study is grounded in hermeneutic tradition, which implies the need to describe the past.¹⁹ Eight training manuals used during the period in question were the primary sources

of information (Table 1). Access to four manuals from the Historical Museum of Nursing was granted by the trustees of the José Llopis Foundation in Alicante, Spain. The other four documents are in the public domain and available on the website of the Official College of Nursing of Madrid (*Colegio Oficial de Enfermería de Madrid*). These manuals were purposefully sampled according to study objectives. The main inclusion criteria were: written in Spanish;

published between 1855 and 1955, and addressed at nurses or other figures historically recognized as being dedicated to the care of sick. In addition, the researchers sought to use manuals that illustrated the material world, technology and health care practices during the period in question. Four of the manuals were illustrated, seven were written by Spanish doctors, and one was written by a French doctor and translated by Spanish doctors (LM7).

Table 1 – Information sources

Code	Title	Author	Year	Publication details
CA1	<i>Manual practico de fleboarteriotomia y otras operaciones de cirugia menor</i>	Cisneros Avilés Bonifacio/	1856	Cáceres. Imprenta de don Nicolás María Jiménez
CM2	<i>Manual para el uso del practicante</i>	Calvo y Martín José	1866	Madrid. Imprenta Nacional
GV3	<i>Manual del practicante y del interno de Hospital</i>	García Velásquez Jerónimo	1901	Madrid. Mariano Nuñez Samper Editor
CB4	<i>Manual del practicante. Anatomía, cirugía menos y obstetricia. Tomo III. Obstetricia</i>	Cubells Blasco Arturo	1903	Valencia. Bubul y Morales Editores.
FC5	<i>Manual de la enseñanza de enfermeras</i>	Fernández Corredor y Chicote Mariano	1917	Valladolid. Taller Cuesta
GT6	<i>Manual del practicante y de la enfermera II. 4 Ed.</i>	García Tornel Lorenzo	1937	Barcelona. Bosch.
LM7	<i>Manual de la enfermera hospitalaria. 12 Ed.</i>	Labré Marcel	[1937?]	Faltan datos.
BC8	<i>Manual teórico practico para practicantes, matronas y enfermeras I y II. 3 Ed.</i>	Box María-Cospedal Antonio	1951	Madrid. Instituto Editorial Reus

Three of the manuals (GT6, LM7, BC8) were successively reedited during the period in question, two are part of an official training program for care practitioners (CM2, CB4), and one was part of a course held between 1917 and 1918 by the Red Cross in Valladolid (FC5). Manual BC8, addressed at midwives and nurses, was granted a quality award by the National Academy of Medicine (*Academia Nacional de Medicina*) in 1944.

Data were collected between March 2012 and June 2013 and sampled using discriminate or theoretical sampling.¹⁸ A total of 3,043 pages were analyzed, whereby 360 objects and 45 procedures described by the manuals were recorded. The analysis was conducted using historical and qualitative methods, regarding index card and memo writing^{18,20} resulting in 423 index cards and 150 memos. Analysis was carried out manually and concurrently with data collection in two stages: open coding, and focused coding.¹⁸ The data was coded, compared, and conceptualized at increasingly more abstract levels to form categories.¹⁵ The elaboration of the analytical memos and the literature review made it possible to move beyond data description to interpretation, while the development of diagrams throughout the study enabled the observation of the relationships between emerging concepts.²¹

RESULTS

The analysis of the training manuals revealed that the material world of nursing care was made up of objects “handed down” by the medical profession and by therapeutic instruments improvised by caregivers from mainly household objects to satisfy patients’ care needs. Hence, health professionals of that time received from the training manuals the mandate to “inherit” and adapt objects, thus shaping the technological material world of nursing care was shaped. The following paragraphs outline the handing down of medical technology and the adaptation and improvisation of instruments in the material world of nursing care during the period in question.

The handing down of medical technology

The material world of health care during the period in question was composed of objects exclusively used by doctors, such as soft urinary catheters, thermometers and sphygmomanometers, that later began to be used by caregivers.

An object was handed down when it was considered easy to use, simple and vulgar for standard medical practice. From the outset, one of the manuals refers to the vulgar nature of the technical knowledge

of health care professionals: "care should be taken to write a brief and compendious description of matters of science; and when it is necessary to vulgarize in order to make it more intelligible, technical language should be economized with utmost care, because only those who follow other kinds of studies will be able to understand it" (CM2:2).

The complex use of objects such as soft urinary catheters was, in principle, reserved for doctors and was not taught to other health care professionals as the following quote shows: "urinary retention - very common, especially among recently operated patients (urine suppression); it is necessary to catheterize, about which we say nothing to the nurse, since we judge that she is currently unable to perform this procedure... [the procedure] is not without serious dangers, and nurses' current grounding in medicine does not authorize them to address these needs" (FC5:149).

As training for care givers became broader based, technical concepts were vulgarized to facilitate understanding and complex objects, whose use had previously been said to be dangerous, were handed down and incorporated into practice as harmless procedures. Therefore, by the twentieth century, care givers were already applying soft urinary catheters: "The most preferable flexible ("soft") red rubber catheter is the Nelaton catheter, which has a diameter of between five and six millimeters and is suitable for both sexes and totally harmless to the urethra" (BC8:103).

Another example is the clinical thermometer. Previously limited to assessing body temperature by using their hands, the clinical thermometer was handed down to caregivers after it had become well known and simplified and the magic of the mercury rising up the tube was no longer surprising. At the beginning of the twentieth century, blood pressure was measured using a sphygmomanometer. Nurses at the time were not allowed to use this instrument, let alone interpret its recordings, because they were not taught how to: "the graphs produced by this apparatus are called sphygmograms; special knowledge is required for this technique and interpretation [of the recordings], which nurses can neither be taught or learn how to interpret" (FC5:107).

The sphygmomanometer was described by the manuals as difficult to use and understand, and only stopped being the exclusive domain of doctors after it was sufficiently simplified and health care professionals were trained how to use it. The sphygmomanometer and blood pressure measurement procedure was only handed down in the middle of

the twentieth century: "there are a number of different devices for measuring blood pressure; however we will limit ourselves to mentioning the fundamental parts that are common to all... the following technique is used to measure blood pressure... now we have both numbers; in any case the measurement should be repeated several times" (BC8:386-387).

Before handing down procedures and the use of medical instruments to care givers, first the technical complexity that the instrument gained in the hands of doctors had to cease to exist. This happened in one of two ways: techniques were simplified so they could be easily taught to health care professionals; or the instruments became seen as vulgar. Instruments were thus presented as being common and not very glamorous, as was the case with the thermometer, whose description in the manuals became limited to its use: "I do not believe that it is necessary to describe the thermometer since it is well known and it is only necessary to explain its use and the techniques herewith so that nurses may understand its scientific use" (FC5:105).

Several procedures and objects exclusively used by the medical profession were handed down to health care professionals. However, the prestige associated with their use was not handed down with them. Paradoxically, despite representing a major accomplishment for care givers, advances in training and increased autonomy, this process exemplifies the subordination of nurses to the medical profession.

When caregivers became authorized and frequent users of handed down objects, these instruments and procedures also became devoid of the symbolic meaning they held when they were used exclusively by doctors. Thus, when caregivers received them they were already considered vulgar objects.

The adaptation and improvisation of health care instruments

Apart from the technological instruments handed down by the medical profession, the manuals mentioned another group of objects: everyday items that were manipulated to improvise therapeutic solutions.

Therapeutic procedures such as the moxa, which involves producing a superficial scab by burning the skin, requires a blow pipe for burning cotton over the skin. This instrument was improvised by rolling paper to form a tube to blow the cotton in order to keep it alight: "to ensure the uniform application of the moxa, burning should

be slow and steady [...]. A blow pipe is helpful for this purpose or, in its absence, we can improvise one with paper rolled into a narrow cone-shaped tube" (CM2:61).

Eye drops were administered using a dropper bottle, in the absence of which a pen barrel could be used, while ointment could be applied to the eyelid using cigarette rolling paper: "ocular medications can be dry, soft, liquid or gaseous. Dry medications are composed of an ultrafine powder, which is administered using a pen barrel by opening the eye and gently blowing a very small quantity... Liquids are instilled in drops inside the eye using a pen barrel [...]. Soft medications are commonly ointments. About the size of a hempseed of ointment should smeared along the edges of the eyelids, or inside the lids using cigarette rolling paper" (CM2:13).

Likewise, in an emergency, any type of object, such as a clean handkerchief, could be used as dressings instead of cotton wool, sterile bandages, and compresses: "the nurse, in the case of an emergency, [...]. But, in the unfortunate case of the lack of any other means, the wound should be covered to protect it from microbial agents using a piece of cloth or handkerchief, provided they are perfectly clean" (FC5:127-128).

The use of everyday items, such as pens, cigarette paper, and handkerchiefs, which were otherwise alien to the material world of nursing care, made them part of it. Such items were often more readily available than the clinical instruments that existed at the time. Furthermore, certain clinical instruments, such as suction cups, were expensive and therefore common glasses were often used instead: "a suction cup is a conical, round-based glass or crystal cup of varying diameters with a circular opening and rounded rim; although not the most ideal option, in the absence of this instrument a common glass, bowl, etc., may be used" (CA1:34).

Safety pins were used in procedures such as wound drainage to hold the surgical drain in place: "clamp the surgical drain [with a safety pin] so that it does not disappear into the wound" (LM7:235).

Safety pins were also used for serum therapy to facilitate the practitioner's work and make it less tiring: "the ampoule is held at a certain height after it has been punctured and the liquid seeps under its own weight, emptying the ampoule, which usually comes with a wire, frame or tape to fasten it the support with safety pins or bandage, thereby avoiding the tiring task of holding the ampoule up" (BC8:619).

Apart from facilitating the work of caregivers and meeting the needs of sick people, the use of com-

mon everyday objects was also intended to ensure the safety of procedures. An example is the use of the nurse's apron as a support during cauterization, as illustrated by the following quote: "general handling and maintenance of the cauterizer. Place a spirit lamp, as free as possible from chlorides, to one side. On the other side, at a distance, place the bellow bottle half, or at the most two-thirds, full of mineral spirits; then firmly close with a rubber stopper with two tubes - one connected to the air intake and the other to hydrocarbon vapor-air mixture... The cauterizer is now set up. The insufflator bulb is entrusted to another person with the express recommendation not begin compression until directed [...]. The nurse should then take the bottle and hang it in her apron, or better, in one of the upper button holes of her dress, rather than holding it in her hands, which would heat up the bottle and lead to the formation of an excessive amount of vapor..." (FC5:133).

The use of everyday objects in nursing care reveals that the nurse's work was manual and reflexive, motivated by immediate needs. The artisan-like adaptation of common everyday objects for clinical use meant that the material world was transformed into a world of unquantifiable resources between 1855 and 1955. One manual illustrates how an umbrella, a piece of wood or cardboard were used as splints to immobilize and protect a fractured leg due to the lack of available instruments: "an apparatus is improvised to transport the injured patient that consists of two splints or boards placed on either side of the leg and tied together in some way [...] carefully covered with linen or cotton to avoid further injury to the member. The split should be made with a piece of wood, zinc or cardboard, etc., a cane, umbrella or board" (LM7:309).

Likewise, a bottle could replace a breathing apparatus flask and a tie and piece of wood became a hemostatic tourniquet. The improvisation of objects arose from specific needs, and the creation of solutions in response to these needs detailed by the manuals reveals that nurse training involved both artisanal techniques and technical skills. Therefore, nursing care depended not only on existing technological resources, but also the creative capacity of care givers, who should seek alternative materials and adapt and improvise everyday objects that gained value and therapeutic meaning in their hands.

The scientific and technical aspects of nursing and the creative and artisan skills of caregivers were manifested in the various objects of the material world of care in the period in question. Objects

recognized as technology represented acquired knowledge and technical skills, while the use of therapeutic instruments improvised out of everyday items emphasized care-giving labor as natural labor within the context of available, homemade and simple resources. Thus, technological innovation was overshadowed by the everyday simplicity of the objects used.

DISCUSSION

The handing down of medical technology and the improvisation of therapeutic instruments out of everyday objects are components of the technological world of nursing during the period in question and show that the construction of this material world was motivated by advances in science and clinical needs. Although the reviewed manuals were not intended to reflect clinical practice, the detailed description of procedures and approaches to common clinical situations provides a plausible indication of what the material world was like during this period and, more importantly, the contribution that health care professionals were expected to make to this world. Thus, through the handing down of technological objects used in clinical practice and by improvising solutions to address care needs using household objects, professional caregivers constructed the material world of technology.

The analysis of the training manuals shows that there is a linkage between the scientific knowledge, technical skills and objects used by professional care-givers and the material world. The knowledge of professional caregivers in the nineteenth century was limited and merely practical, while the use of health care instruments required few technical skills. By the twentieth century, the technological stock had expanded significantly, partly due to the handing down of medical technology. This represented an accomplishment in terms of theoretical knowledge and technical practice. Therefore, the handing down of instruments and procedures that were initially reserved for the medical profession could be said to be an historical situation that may help to explain the sophistication of current nursing practice.

Studies regarding the history of intensive care units also show that certain instruments and functions that previously belonged to doctors were handed down and that nurses working in these units incorporated these procedures into their practices, widening their knowledge and taking on more responsibilities.⁹⁻¹⁰ The technological sophistication of the nursing practice that occurred in Spain between

1855 and 1955, marked by the handing down of medical instruments and procedures exemplified by the manuals, led to advances in the training and technical status of health care professionals. However, it appears that this did not occur in the scientific side of the profession, since the handing down of medical technology subtly conditioned the development of a care-related scientific field and reinforced nursing's subordination to medicine.²²

The analysis of the training manuals provided an insight into another group of objects that reflected the art of caring for the sick and the resourcefulness and creativity expected from those dedicated to their care between 1855 and 1955. Though these objects were more simple than those that were handed down to caregivers, they were effective in nursing care. Improvisation and invention have always been part of everyday expert nursing practice.² One of the objects mentioned by the manuals that is particularly worth mentioning is the nurse's dress, as nurses' uniforms were called in the manuals. At first sight, the nurse's dress does not seem to bear any relation to the material world of nursing care. The nurse's dress has drawn the attention of some historians of the nursing profession in Spain, who mention the strict requirements of appearance for nurses and describe this garment as a distinctive, and even a symbol of collective submission.¹³ The present study shows that this garment is an element of the material world of nursing care; an instrument that has been created and used.² The practical and instrumental function of the nurse's dress as a support for another therapeutic object turns it into a technological device with which professionals interact.

Apart from demonstrating resourcefulness and creativity, the adaption of the objects described in the manuals also reveal the technical aspects of nursing practice, whereby technological solutions were provided in response to the contingencies and needs of the sick. Likewise, it could be said that the technical skills and professional status of nurses during this period were forged not only through increasing knowledge, delegated functions, and the handing down of objects used by the medical profession, but also due to their creative capacity to provide material answers to real needs.

It is apparent that previous historical studies do not consider improvised instruments as health care technology. However, given that technology is any instrument that satisfies human needs,¹ this study clearly shows that they were as this is exactly what these objects did. Although the historiography of Spanish nursing refers to the use of material resources

to care for the sick in different periods,⁵⁻⁶ the improvisation of instruments has not been duly recognized.

The practical and representative function of these objects - referred to as the double edge of technology,² and the various meanings assigned to them²³ are evident in the manuals. Furthermore, the fact that these objects were specifically mentioned in training manuals shows that the use of a combination of handed down clinical instruments and everyday household objects influenced the development of nursing in Spain during this period. However, the use of handed down objects reinforced the social image of nursing as being subordinate to medicine, while the use of improvised objects generated an unstable balance in the social image of these professionals, given that the practice was neither wholly clinical nor wholly domestic.

CONCLUSION

The analysis of the training manuals provides a deeper understanding of the material world of nursing care in Spain between 1855 and 1955 and thus contributes to our understanding of the history of nursing. By identifying and analyzing the use of handed down and improvised objects, this study provides an insight into how professionals act on the material world: a world that was evolving - just as the nursing profession was - and whose borders were open to the incorporation of handed down objects and any adapted or improvised object. Objects that professional caregivers could use, elaborate, hold in their hands and complement. Nevertheless, this study has limitations that derive from the sources of information: the manuals were written by doctors and therefore present only a partial view of the material world of nursing care.

Hence, while the handing down of objects from the medical profession may represent a theoretical and technical accomplishment, it is not clear whether it also represents a scientific achievement, and this is a possible path for future studies. The artisan-like and ingenious nature of nursing practice promoted in the training manuals, could be explored further in future studies to contribute to the recognition of therapeutic objects improvised out of everyday items as a nursing care technology.

Apart from learning how to be an assistant and to use healthcare-specific objects handed down by other disciplines, caregivers undergoing training were expected to design and improvise instruments and materials. This image was projected by the doctors who wrote these manuals, adding a new

dimension to doctor/nurse relationship that is also worth exploring.

It is hoped that this study provides an insight into the material world of the nursing profession in Spain between 1855 and 1955 and how nurses interacted with and shaped this world. It comprises an invitation to look at and reflect on the practice of nursing, its relationships and physical environment. Additional historical studies about technology to care for the sick and its value and meaning to the nursing profession in Ibero-America might seek to explore the issues raised by this study in greater depth and contribute towards providing a greater understanding of the use of this type of technology and its effect on nursing practice and the social image of the profession.

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