Implanted drug delivery systems, a revolutionary advance in nursing care: a literature review

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Abstract:

Technological advances in the health area, and within it in nursing itself, have optimized each one of the processes related to the care, diagnosis and treatment of diseases. Therefore, nursing professionals must develop skills in managing these technologies in parallel with digital development. Today, there is an increase in the population with chronic diseases and/or disabilities that could be favored with the use of these devices. With our work, we have proposed to carry out a review to identify the knowledge and use of implanted systems for drug administration and the advantages they offer in nursing care. Methodology: A bibliographic review was carried out in the database, Clinical Key, using the keywords: technological devices, innovation, health devices, technological advances, implanted drug administration systems and nursing care; having as inclusion criteria: articles published between 2016-2022, in full text and in three languages, a total of 16 articles is obtained. This review takes into account the ethical considerations of health research and copyright. When carrying out the analysis, a category called: implant systems for the administration of drugs applied to nursing care is established with a subcategory, Devices used in adults. Technological development in the health area has exponentially improved the diagnosis and recovery of patients, which has made it possible to provide them with timely and excellent care. For the nurse, this device becomes an invaluable support tool for nursing interventions when it comes to medicating the patient, which favors their speedy recovery, within the framework of humanized care.

Keywords: technology, innovation in health, technological devices, technological advances, implanted health systems medication administration, nursing care

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1. Introduction

Nursing is a profession that throughout history has been dedicated to the care of others, concentrating its time and efforts on comprehensive patient care, thus ensuring an adequate evolution of the health-disease process. But with the advent of technological advances, it has been influenced and at the same time benefited by numerous innovations that have been revolutionizing the actions of our nurses (Arandojo, 2016)

Nursing care develops specific knowledge through basic research and applied and is supported by technology, legislation, health economics and educational and management techniques and has quality care as a fundamental objective (Arandojo, 2016, p.15)

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Information and Communication Technologies, known as ICTs, are here to stay, as they have gradually transformed the current health system, opening wide horizons that renew and improve relationships between patients and healthcare professionals. Health. (Domínguez and Domínguez, 2012) (Fortuño and Vidal, 2007)

Therefore, in order to maintain one of the fundamental pillars of well-being, health systems have seen the need to seek new forms of organization and management when providing health services, optimizing existing resources and guaranteeing excellent assistance. (Domínguez and Domínguez 2012).

For all of the above, they have been given the task of implementing the daily use of various types of devices that, through the exchange of information, make communication between them possible in people, information and communication technologies. In other words, our profession, like many others, has been adapting to the development of these futuristic technologies (Arandojo, 2016)

Technological advances have changed and will continue to change the way in which nursing professionals provide care to patients, also modifying the workflow and minimizing human errors, thus facilitating and making nursing work safer nursing (Arandojo, 2016; Rodríguez, 2021).

Some of these revolutionary advances in the field of nursing that are already beginning to be implemented in hospital health services are: improved communication systems, electronic records, relocatable information, real-time location systems, new and better diagnostic tools, smart alarms, new technologies to improve patient mobility and drug administration with implanted systems, the latter being the one that will be reviewed in our work (Rodríguez, 2021)

Therefore, the proper use of ICT facilitates professional performance, so it is necessary to take advantage of them as an unparalleled opportunity for the development of our nursing staff, thus raising the quality of care (Fortuño and Vidal, 2007)

In this paper, we will make a brief review in order to identify the degree of knowledge and use of implanted systems for drug administration and the advantages they offer in nursing care.

2. Methodology

2.1 Type of study

Bibliographic review: it is a written text with the aim of presenting a synthesis of the readings carried out, and includes three phases: documentary research, reading, recording of information, and the elaboration of a written text with the in order to conclude, as well as to differentiate the findings that are of personal interest and with information related to the topic (Peña, 2006).

The elaboration of the bibliographic revision culminates with the elaboration of a written text, in which a synthesis of the route that was made of the texts is presented, followed by some conclusions. (Gómez et al., 2021).

2.2 Collection of information.

This review began with a search in different databases, but results were only obtained from two databases that were Clinical key and Science Direct, used as keywords: technology, innovation in health, technological devices, technological advances, implanted health systems medication administration and nursing care, the search was conducted in three languages: Spanish, English and Portuguese.

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2.3 Inclusion criteria:

• Years 2016-2022

• Scientific articles in full text publication.

• Free access articles.

3. Results

The results obtained in the consulted database are presented below. It is important to clarify that searches were made in other databases, such as Scopus, but no articles pertinent to the subject were found.

3.1 Clinical key:

Of the total number of articles identified, the potentially relevant ones were taken, then the duplicates were excluded, from which those with full text were taken, finally 13 articles pertinent to the topic were selected.

3.2 Category

of implant systems for the administration of drugs in Nursing Care: from the review, articles were found that describe the characteristics associated with implant systems for the administration of drugs in Nursing Care. Technologies applied to the field of Nursing are on the way to revolutionizing traditional uses and customs in the profession. These devices have changed the way nurses will care for their patients, but they have also changed workflow and the extent of human error. By extension, these are technologies that make the work of nurses safer and physically less demanding (Ortiz-Dosal et al., 2014).

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3.3 Subcategories

In the literature review, different devices were found that allowed establishing the subcategory presented below: Subcategory implant systems for the administration of sustained-release drugs used in adults.

4. Discussion

The different types of formulations, whether oral or parenteral, in this case, make possible these changes in drug release, which cause different types of release: delayed, sustained, prolonged or accelerated.

Drug delivery implant systems, usually sustained release, prolong the duration of effects and avoid lack of protection and therapeutic toxicity, in addition to side effects, they also considerably facilitate and humanize nursing work.

The main routes used within the parenteral are intravenous, intramuscular, subcutaneous, intraperitoneal, or intrathecal. They are characterized by presenting zero-order kinetics

and, in addition, there are release-modulating factors that allow the desired release rate to be set.

I. Prolongation of the duration of the effects:
One of the fundamentals of the Modified Release Systems (MRS) is to prolong the duration of the effects, increasing the dosage interval by keeping the levels constant, to avoid that the nurse and the patient have to go through that process repeatedly, and in this way do it at widely separated times.

II. Avoid lack of protection/therapeutic toxicity/human error:
These systems are also intended to avoid therapeutic lack of protection or toxicity due to non-compliance with the dosage regimen, minimizing human error during the administration of the drug by the nursing staff.

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III. Reduce side effects:
On the one hand, reduce side effects due to the repeated administration of immediate release doses, and/or due to iatrogeny committed by nursing staff. On the other hand, to avoid the loss of the active due to distribution in the exophase, which could cause more unwanted effects.

4.1 Route of administration

The implants make parenteral administration, whether intravenous, subcutaneous, intraperitoneal or intrathecal, easier for the nurse, where precision and constant administration are essential, considerably minimizing the opportunity for human error. Subcutaneous and intrathecal devices are extremely useful in cases that require continuous administration of the active ingredient for long periods of time, from days to years. The foregoing guarantees the correct dosage of the drug without the need for repeated calculations by the nursing staff, thus optimizing their work (Suñé, 2002; Ramírez, 2017).

4.2 Characteristics of the systems that make quality and excellent nursing care possible.

They are usually macroscopic monolithic systems with an approximate size of 0.5 cm, which require a trained nursing staff for their implantation under the skin or muscle, having the advantage of not being biodegradable and being able to be removed in an emergency due to the occurrence of a massive and erroneous release of the drug.

They are also sterile and biocompatible, since they will be in contact with the body for a long period of time. (Theeuwes, & Yum,1976)

4.3 Advantages of the applications:

- Drugs with a narrow therapeutic margin; thus managing to maintain plasma concentrations within effective limits, without causing pressure on the nurse.
- Drugs of rapid absorption, guaranteeing a reduction, without effort on the part of the personnel administering the drug, of the high plasmatic peaks, related to the adverse effects of said drugs.
- Drugs with a short duration of action, which require several daily administrations, for which programmable devices are preferably used.

4.4 General advantages and disadvantages of the systems:

- Reduction in the frequency of administration, since it increases in the dosage interval, as the drug is released in a sustained manner.
- Decrease in the incidence of adverse effects, by reducing the fluctuation of plasma concentration, due to fewer administrations. (7,19,21,26,27)
- Difficult control in cases of overdose.
- Higher cost, and lack of comparative studies due to little time and experience in the use of these devices.

5. Conclusions

There are various types of implanted drug administration systems, which allow different pathologies to be treated, reducing the workload of the nursing staff, which is achieved by guaranteeing the correct implantation of the device by trained personnel.

These implants, despite being relatively new in use, have great advantages for the patient and the nursing staff, since they guarantee the reduction of administration through

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multiple doses, as the medication is released in a sustained manner and also reduce the appearance of adverse effects, by keeping the plasmatic concentration of the drug stable due to the smaller number of administrations. In addition, they humanize nursing work, reducing the burden of care when complying with medical indications, specifically in parenteral drug administration, and they manage to reduce errors when calculating and administering doses.

Despite these advantages, disadvantages were also identified, such as: risk of over or underdosing secondary to poor handling of the device or medication, which may be caused by poor training of the nursing staff. In addition to difficult control of patients in case of overdose.

Other disadvantages are the relatively high cost of the implant and the low number of comparative studies due to the short time the devices have been in use.

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