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# CLASSIFICATION OF TRAINING ENGINEERING RESULTS USING DIGITAL TOOLS: CASE OF PATIENTS TREATED BY DIALYSIS METHOD

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## ABSTRACT

Data classification consists of organizing them into categories according to agreed criteria. Carefully planned classification enables more effective use of critical data and its protection across the enterprise; it also participates in risk management and legal knowledge and compliance processes. There is no universal approach to data classification. However, the classification process can be broken down into four key steps, which you can customize to meet your specific business needs when developing your data protection strategy. In this article we have tried to classify the results of training engineering by taking into consideration professional training carried out with health care personnel on dialyse. The subject focuses on the classification of training engineering results using numerical tools, focusing on patients treated by the dialysis method. The aim is to categorize outcomes related to training using digital technologies, based on data from patients undergoing dialysis treatment. This approach aims to identify patterns and trends in outcomes for a better understanding of patient needs and progress. The use of digital tools makes it possible to efficiently collect and analyze medical, laboratory and quality of life data from patients, in order to classify the results according to their health status, their response to treatment and their evolution over time. This methodology offers advantages for personalizing care, anticipating patient needs and improving the overall management of patients on dialysis.

**Keywords**: *Classification, Training Engineering, Digital Tools, Perineal Rehabilitation*

## 1. INTRODUCTION

In a universe of extraordinary change in Decision support tools provide a certain methodological support. You still have to know how to use them wisely. This publication presents the essential tools to know to make the best choice. But the central question for the simplification of data processing is: how to choose between several options? The first instinct is to trust the tools available. This principle has the advantage of ease, but relying totally on one's feelings has limits, especially since there are many tools to facilitate decision-making. In general, they fall into several categories depending on their purpose: analyzing a problem, looking for the causes at the origin of the situation, finding possible solutions, ranking the best options, choosing the most appropriate solution. For the majority of them, they are also used to solve a problem. Logical observation since making a decision means positioning oneself in relation to a problem: understanding the context of the subject, identifying all the input elements and in the end choosing the best option. The advent of digital technologies has opened up new perspectives in many fields, including health. In the medical context, training engineering is positioned as a promising tool for improving patient care by combining medical data and technological advances. One of the key areas where this synergy finds significant application is in dialysis-treated

patients. Dialysis, as a crucial method for patients with advanced kidney disease, benefits from the exploitation of digital tools to classify and interpret training engineering results. This innovative approach offers the possibility of personalizing care, improving medical decision-making and optimizing the quality of life of patients. At the heart of this evolution is the classification of training engineering results, which involves categorizing complex data collected from patients undergoing dialysis using sophisticated digital tools. This classification makes it possible to analyze and understand health indicators, treatment responses and progression trends, thus offering a holistic and personalized view of patient health. As a result, healthcare professionals are better equipped to make informed, individualized decisions, tailoring treatments to each patient's specific needs. However, behind this promising step lie challenges and questions that deserve careful consideration. Concerns about data privacy, reliability of results, accessibility of technologies, and ethical implications prompt debate about how to maximize benefits while minimizing potential harms. This research explores the advantages and disadvantages of training engineering outcome classification using digital tools for patients on dialysis, taking a close look at current limitations and future prospects. By addressing these issues, this study aims to lay the foundations for better, more personalized and efficient medical care for patients treated with dialysis. In this article, we have carried out a short-term internal evaluation, an immediate hot evaluation of satisfaction was sent to all the people trained, this evaluation required a kind of classification of the data, which is why we used the google forms digital tools to simplify data management and classification. The choice of the subject "Classification of training engineering results using digital tools: case of patients treated by dialysis method" is justified by several relevant and important factors, both from a medical and technological point of view. Dialysis is a crucial treatment method for patients with advanced kidney disease. Improving understanding of these patients' outcomes and progress can have a significant impact on their quality of life and overall health. Digital tools and data analytics have transformed the healthcare industry by providing new possibilities to monitor, analyze and interpret medical data. This approach allows for more precise and personalized decision-making. Classification of results using digital tools can enable personalized care for each patient. This leads to more appropriate interventions, better treatment management and anticipation of individual needs. Better classification of outcomes can help healthcare professionals optimize the use of medical resources by focusing on patients who need them most, while improving the effectiveness of treatments. Training engineering applied to health opens up new perspectives. This study may contribute to innovation in medical education by using digital approaches to analyze outcomes and teach future healthcare professionals. Dialysis presents unique challenges and specificities. Outcome classification can help understand how different medical and environmental parameters influence patient outcomes on dialysis. The data collected and analyzed in this study can serve as a basis for further medical research and contribute to the continuous improvement of treatment protocols. This subject involves a combination of expertise in medicine, digital technologies and training engineering. This interdisciplinary approach can foster constructive discussions and collaborations between different disciplines. This subject justifies its importance by its ability to unite medicine, technology and engineering to improve the care of patients on dialysis. By using digital tools to classify results, this study may have a significant impact on patient health, medical education, and future approaches to personalized medical management.

## 2. MATERIALS AND METHODS

Among the range of tools available to managers and project managers, here are 5 instruments particularly dedicated to decision-making: the decision tree, the decision matrix, Pareto's law, Eisenhower's matrix and Methods quantitative decision support.

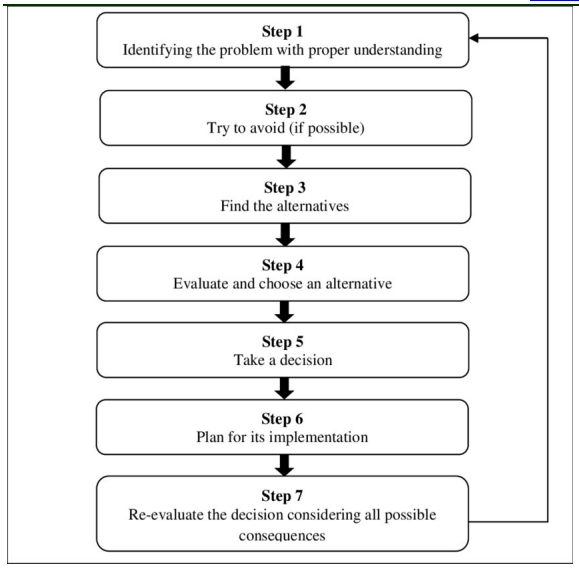


*Figure 1: Steps For Decision Making Process*

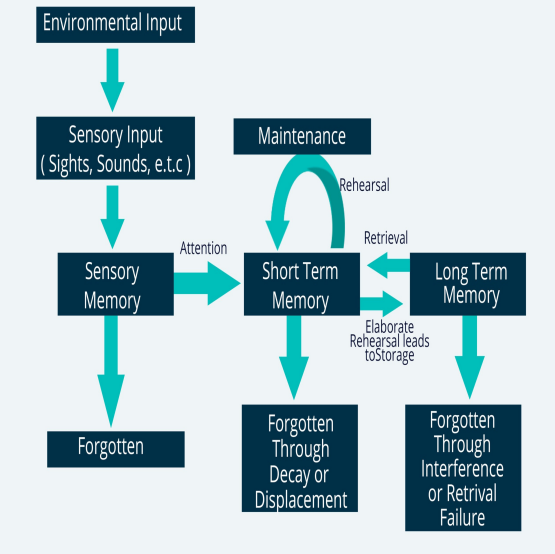


*Figure 2: Information Processing*

To properly address this subject, we have formulated the following problem: How can digital tools be effectively used to classify and interpret the results of training engineering in the context of patients treated by dialysis method, with a view to to improve the personalization of care, medical decision-making and the quality of life of patients?

Regarding our study, we used the decision matrix while simplifying the collection of data using the digital tool "google forms" directly after having carried out specific training on the "METHOD OF DIALYSIS". This is a short-term internal evaluation, an immediate on-site satisfaction evaluation was sent to all trainees. The objective of the training is to improve the care of dialysis patients, as well as to develop the skills of health professionals for the practice of dialysis treatment method techniques.

## 3. TECHNOLOGICAL TOOLS FOR INFORMATION PROCESSING

Information processing or data processing normally refers to the information technology industry. The processed data includes audios and videos, graphics and texts. The term can also refer to enterprise processing applications or multimedia processing applications[1]. There are event stages in information processing: input (data acquisition, data entry and validation), processing, storage and output (interactive queries and routine reports).

Archiving or deleting data may be the fifth step in information processing. A database is a basic tool used to process information and to efficiently manage and store data[2]. A database can also facilitate data retrieval. It is a structured collection of collected data. A good database not only gathers data efficiently; it retrieves information quickly. A database management system is software commonly used to store product inventory and customer information. Keeping information in databases makes coordination with multiple users efficient[3]. This is where its popularity with e-commerce sites lies. The flexibility of the DBMS makes searching for data, sorting and updating inventories and product descriptions more efficient. There are many types of databases. The most common types are flat model, hierarchical, network and relational. Servers are networked computer systems. Different computers within a network can share files on a server. A PC can act as a server, and it can be an IBM mainframe. "Server" may refer to the PC. In this case, the term refers to both software and hardware. However, it may refer to software only[4]. An example is web server, which refers to a PC that runs web server software. A search engine retrieves information from a collection of data like in a library catalog. Today, the term more commonly refers to an information processing tool that retrieves queried data from Internet databases. This computer program produces a list of web pages containing the search terms[5]. Information and communication technologies (ICT) include all the tools, services and techniques used for the creation, recording,

processing and transmission of information. It is therefore mainly about computers, the Internet, radio-television (live and deferred) and telecommunications. We also speak of new information and communication technologies (NTIC) to designate the tools born from the rapprochement of computing, telecommunications and audiovisual, such as smartphones, microcomputers, tablets, the Cloud, etc The evolution of Information and Communication Technologies (ICT) is closely linked, on the one hand to their uses and appropriations by human actors, on the other hand to the functional scope they cover and to the technical performance they achieve within organizations[6].

But this three-dimensional vision is relatively recent. It is the result of research that has highlighted the oversizing of the technological dimension to the detriment of the other two: human and functional.

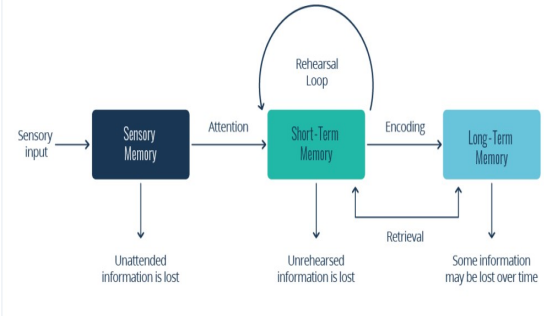


*Figure 3: Multi-Store Model Of Memory*

Our article presents the evolution of ICT through a three-dimensional approach, trying to explain the paradigms that were used to build this approach.

While apprehending the contributions of the evolution of ICT from several angles, we note the importance of new questions such as the "green" dimension of ICT. Business management, including decision support, has been one of the main fields of computer applications[7]. Almost all sectors have been transformed by the rise of IT: transport, office automation, document management, medical IT, banking, cinema (→ synthetic image) press and publishing (with DTP, desktop publishing), etc. These industries have had to adapt to multimedia techniques and Internet business models that often rely on free access. The recording industry particularly suffers from the illegal downloading of files. It saves considerable time for repetitive tasks. The data processed is valuable information that can be used for other purposes[8].

## 4. CLASSIFICATION OF INFORMATION'S AND RESULTS

Data classification is a process of analyzing structured or unstructured data and organizing it into categories. This organization is done according to the type and content of the files. To start this process, it is necessary to search for certain strings of data in the files. The data classification process involves searching for certain strings of data in files, much like finding all references to contained in a network. Data classification helps you determine and assign value to your organization's data and provides a common starting point for governance[9]. The data classification process classifies data based on its sensitivity and business impact to identify risks. Once the data is classified, you can manage it in a way that protects sensitive or important data from theft or loss.

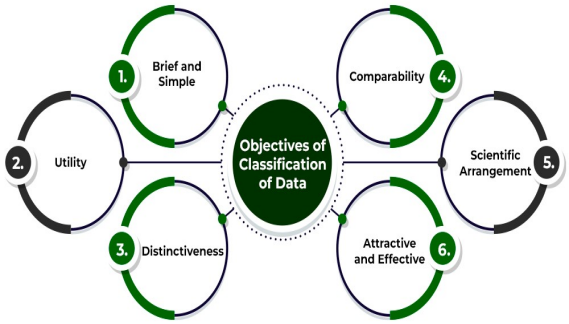


*Figure 4: Objectives Of Data Classification*

All resources identified as potential candidates for cloud migration or deployment should be associated with metadata that records data classification, business importance, and billing responsibility[10]. These three classification points can be very helpful in understanding and mitigating risks.

From data classification, it is possible to improve data security and regulatory compliance. In particular, it makes it possible to secure critical company and customer data[11]. To this end, the prerequisite for the company is to know and understand the data produced. For this, it is necessary to answer a number of questions. For example, the company must know: What sensitive data it has? Where is this sensitive data hosted? Who can access, modify or delete them? What is the impact of disclosing, modifying or destroying this data on the company?

Based on the answers obtained and the information emerging from the threat overview, it will be possible to protect sensitive data by assessing the

levels of risk. Also, it helps prioritize initiatives and plan and implement data protection and threat detection. One of the important steps of it is the identification of sensitive data[12]. It is possible to automate data identification using dedicated applications. These help identify systems and resources that may contain sensitive information. Some of these tools even indicate the volume of the data as well as its potential category.

## 5. ENGINEERING TRAINING

In training, there are three kinds of engineering: training device engineering, training engineering and pedagogical engineering. These engineering are complementary in achieving the main objective of a professionalizing training organization, namely to train competent learners[13]. Let's take a look at training engineering, born at the end of the 1970s. If, since its existence, this concept has not stopped evolving according to research work in the sciences of education, its purpose remains the same: the production of knowledge and skills related to the professional or social situations of individuals[14].
Here are some key concepts to know on the subject. Training engineering, as defined by Philippe Clauzard, teacher-researcher and doctor in adult training and educational sciences, is a set of methodical and coherent approaches that are implemented in the design of actions or systems. training in order to effectively achieve the desired objective. These approaches (which are carried out in different successive and iterative stages, in a continuous process) aim to significantly improve the quality and working conditions in the company, in particular, thanks to an effective training plan. This involves maximizing the impact of investments in human resources development, for example, by improving working methods and climate or by upgrading the company's skills[15].
Training engineering is a set of methodical approaches to design actions or training systems to reduce the gap between the required and the acquired in terms of competence. In other words, training engineering brings together the different processes implemented by the sponsor and the director to build a training action, from the analysis of the relevance of the training response and training needs to design, implementation and evaluation. Training engineering therefore includes the following phases: Analysis of the relevance of the training response to reduce the gaps identified between the skills required and the skills available; Definition of training objectives; Definition of educational objectives; Development of the training program; Coordination and monitoring of the implementation of training; Evaluation design[16]. The training carries with it its paradox: making it more autonomous and reactive in a universe of constraints produced by the institution.
Training engineering is in tension between the socio-constructivist and humanist foundations of adult training, and social pressure and economic profitability. The purpose of training engineering is the production of skills and knowledge, in connection with professional or social situations[17].

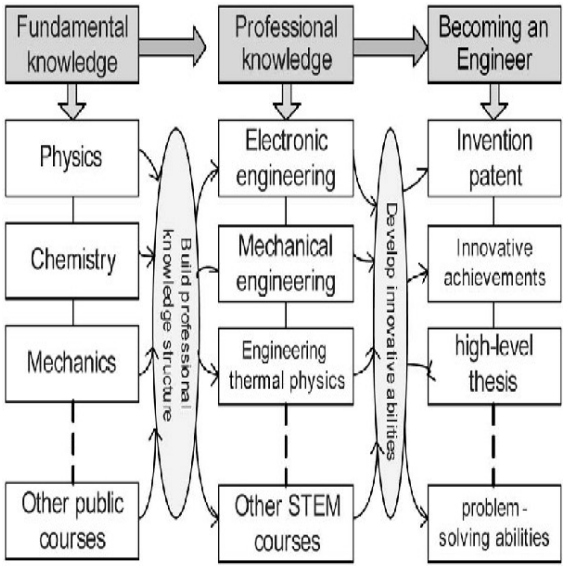

*Figure 5: The Process Of Training Engineers*

Assessment is a set of methods, quality techniques and insights (insights) to determine if a service offered to people is necessary and likely to be used, if it is delivered in the way intended and if it is actually helpful to people. Marc Dennery defines training evaluation as all the actions undertaken as part of a formal process in order to analyze either the effects of training on learners, or the quality of an action or project of training, or the sustainability of a training system and its impact on the overall performance of the company, and to compare these effects or this quality, or even the degree of sustainability of the system with regard to the investments made[18] . Engineering is at the service of training and seeks to combine social promotion, continuous vocational training and lifelong education. Today, the challenge for Training Managers is to provide a training offer to employees with more flexibility in a logic of constant round trip of information between employees and HR professionals. Modernity,

simplification, and coordination then become key issues for the function.


*Figure 6: The Training Engineering Approach*

New information and communication technologies (NTIC) cover digital tools and products that can be used in the context of education and teaching (NTICE = NTIC + Education). They make it possible to reach an increasingly large audience and to offer new methods for carrying out training (new media, new organisations). In particular, digital training (e-learning or distance learning) makes it possible to disseminate knowledge in areas of varied skills and to reach new targets[19]. In response to identified needs and with the aim of enabling our partners to set up innovative training systems adapted to their audiences and needs, we offer our expertise in training engineering, and in e-learning engineering and also in multimedia educational engineering[20]. The originality of this training is also the consideration of the specificities of the countries, as well as its adaptation to any project being deployed which will use e-learning (partially or totally) and the experimentation of various digital tools to the processing of data and information.

## 6. PATIENTS TREATED BY DIALYSIS METHOD

Patients treated by dialysis method constitute a special medical population that requires intensive and specialized care due to advanced kidney problems. Dialysis is a life-saving medical procedure for people whose kidneys are not working properly to remove waste and excess fluid from the body[21]. Patients with end-stage kidney disease, such as chronic kidney disease, often depend on dialysis to maintain their chemical balance and remove toxins from their blood.

There are two main types of dialysis: hemodialysis and peritoneal dialysis. In hemodialysis, the patient's blood is filtered through a machine that removes waste and excess fluid, and then the clean blood is returned to the body[22]. Peritoneal dialysis involves the use of a special solution that is introduced into the patient's abdomen, where it absorbs waste and excess fluid before being removed. Dialysis is an essential medical treatment used to partially replace impaired kidney functions in patients with advanced kidney failure. Kidney failure occurs when the kidneys fail to effectively remove wastes, toxins, and excess fluid from the blood, leading to chemical and life-threatening imbalances in the body. Dialysis plays a vital role in the survival and quality of life of patients with end stage renal disease. However, it requires rigorous commitment and significant lifestyle adjustments[23]. Patients undergoing dialysis must follow a restricted diet, take medications and manage side effects related to the procedure. Using digital tools to monitor and classify dialysis outcomes can improve the care of these patients by providing detailed insight into their health and treatment responses. This approach promises personalization of care, anticipation of individual needs and optimization of quality of life for patients treated with dialysis. However, it requires a careful assessment of the pros and cons to ensure effective and ethical use of digital technologies in this critical medical context.

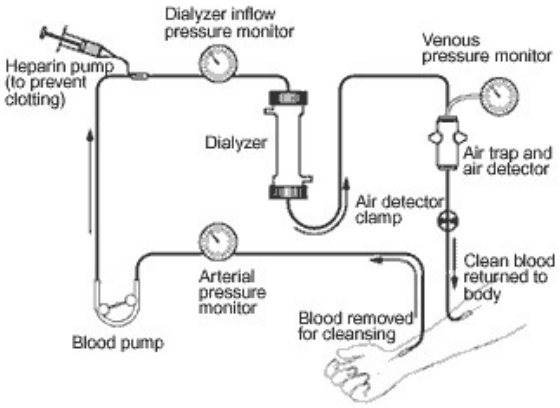


*Figure 7: Dialysis Method Treatment Process*

Patients on dialysis face complex challenges, including managing regular dialysis sessions, monitoring their diet, taking medications, and managing complications related to their condition. Also, they often face problems such as fatigue, depression, bone weakness, and restriction in daily activities.

Using digital tools to track and classify training engineering outcomes in these patients offers significant benefits, such as increased personalization of care, evidence-based medical decision-making, and improved quality of life. . However, it is important to consider challenges related to data privacy, reliability of results, and technological accessibility to ensure that these solutions truly meet the needs of this vulnerable population.

## 7. EVALUATION OF TRAINING ENGINEERING IN CAS OF PATIENTS TREATED BY DIALYSIS METHOD

The training engineering with didactic space creates an environment to train people through conferences and specific courses. Learning styles can differ from person to person and can range from auditory learning to visual, verbal, logical or physical learning[24]. However, engineering education is the only type of learning that most individuals find beneficial. The training engineering program is like a guide (practical training) that is provided to people to help them in developing their skills and preventing the complications and family problems they face.


*Figure 8: The Basics Of Training Evaluation*

The purpose of hands-on training is to help people learn actively by performing, evaluating, discussing, and analyzing inside and outside the classroom. Practical training allows people to learn by doing, unlike theoretical education, which uses written material[25]. Less emphasis is placed on the transmission of knowledge in this type of training and more emphasis is placed on the development of skills.

Patients treated by dialysis method makes it possible among other things. To understand the installation of these disorders and to be able to treat them as well as possible by dialysis method. Activities that help people understand, seek, discover and apply new knowledge are included in practical training. An important aspect of hands-on training that sets it apart from other learning approaches is its emphasis on experience rather than just listening as a means of gaining knowledge. Practical training is relevant for the dialysis method, especially in Morocco. Many patients experience dialysis complications. Therefore, practical training is needed for the treatment of dialysis method to cope with the increasing number of patients in Morocco. Practical trainings are frequently implemented to prevent and treat patients using the dialysis method. Patients receive specialist care in a private setting. Practical training is implemented to restore the balance of all structures, which contributes to the functionality of dialysis. A hands-on training program provides information and skills in dialysis method care. Patients are given instructions on how to cope with the demands of the dialysis method. Accordingly, the majority of practical training programs for dialysis patients include or are based on specific exercises.


*Figure 9: Process Of Evaluation Training Programs*

Therefore, dialysis patients can be easily implemented with the help of hands-on training. In this context, we have set up specific training for the benefit of health personnel, the training focuses on improving their technical skills using the digital tool google forms.

## 8. RESULT:

The results of the use of digital tools in the case of patients treated by dialysis method have demonstrated significant advantages for the management and follow-up of these patients.

Digital tools have enabled real-time monitoring of patients' vital parameters during dialysis sessions. This allowed healthcare professionals to quickly detect any abnormalities or complications, which improved the safety and quality of care. Data collected through digital tools has helped to personalize dialysis treatments according to individual patient needs. This allowed adjustment of treatment parameters such as duration and intensity of dialysis to optimize results. Data analysis algorithms helped identify risk patterns and predict potential complications. Health professionals were able to take preventive measures to minimize the risk of complications such as hypotension or hyperkalemia. Patients were able to benefit from remote monitoring of their state of health thanks to applications and connected devices. This has improved their quality of life especially the need for frequent trips to hospital and allowing them to manage their condition more independently. Digital tools have enabled better management of hospital resources by optimizing the planning of dialysis sessions according to patient demand. This has helped reduce waiting times and improve the efficiency of dialysis services. The use of digital tools in the case of patients treated by dialysis method has led to significant advantages in terms of real-time monitoring, personalization of treatment, prevention of complications, remote monitoring, optimized efficiency, longitudinal monitoring and big data analysis. These results demonstrate the potential of integrating digital technologies to improve the quality of care and quality of life of hemodialysis patients. As part of the research activities related to our doctoral thesis, we set up specific training on dialysis treatment methods for patients, then we set up an internal evaluation of short duration, an immediate satisfaction assessment was sent to all the people trained using the digital tools available, more particularly the google forms. This training focuses on the nottingham perceptual health status and the rosenberg social self-esteem scale. The objective of the training is to improve the treatments and health status of dialysis patients.

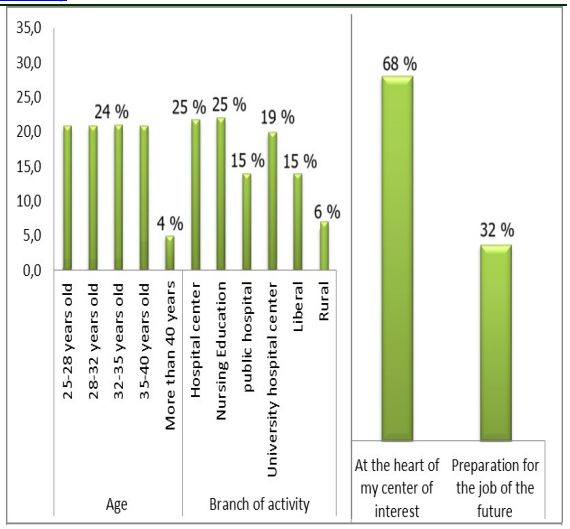


*Figure 10: Study Context And Population*

The figures above indicate that of all the people trained are interested in this training in Morocco, most of the respondents belonged to the age group of 28-32 years (24%) followed by 32-35 years (24%) and 35-40 year olds. years (24%), the 20-25 year olds (24%) and the over 40s (4%).

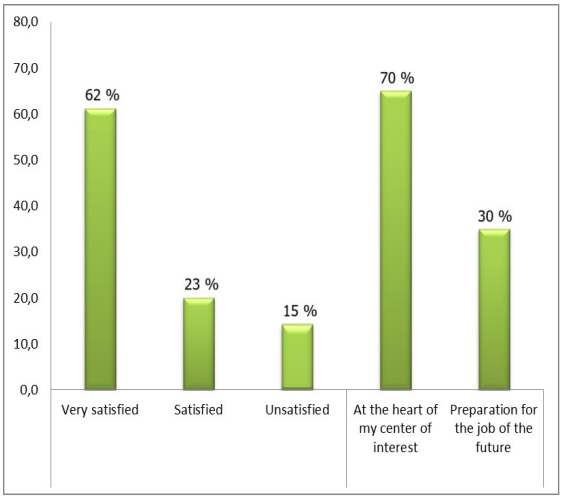


*Figure 11: Interest And Level Of Satisfaction*

The figure shows that most of the respondents felt that the beginning of training on dialysis treatment methods is the subject of an improvement in their qualifications, so is that they have a double interest first to do well meet the requirements of the trades by improving technical knowledge relating to dialysis treatment and the second by specific exercises. Thus directly after the training, the majority of the participants declared themselves very satisfied with the training with a percentage of

62%, 23% declared themselves satisfied, while 15% of the participants declared themselves not very satisfied. This means that the training was well conducted and that the objectives were well achieved.

Concerning the comparison, we can title several advantages and disadvantages of this research work compared to the old works carried out on this subject. Among the advantages of the work carried out on the classification of training engineering results using digital tools for patients treated by dialysis method, the use of digital tools to classify the results allows personalization of care for each patient. The data collected can be analyzed to adapt treatments according to individual needs, thus improving the efficiency of care. Digital tools allow continuous monitoring of the health parameters of patients treated with dialysis. This allows healthcare professionals to quickly detect any changes or complications, which can lead to early intervention. Outcome classification provides physicians and healthcare professionals with accurate, evidence-based information to make informed decisions about treatment protocols and necessary adjustments. By better understanding the individual needs of patients, medical resources can be used more efficiently, avoiding unnecessary treatment and focusing on patients requiring special attention. Personalization of care based on outcome classification can contribute to a better quality of life for dialysis patients, minimizing side effects and improving symptom management.

On the other side, among the drawbacks of the work carried out on the classification of training engineering results using digital tools for patients treated by dialysis method, the collection and analysis of patient health data raise concerns about privacy and data security. Digital devices must be secure to protect sensitive medical information. Classification results depend on the quality and accuracy of the data collected. Measurement errors or incorrect data can skew results and lead to wrong medical decisions. The use of digital tools may require significant investments in terms of technological infrastructure and equipment. This can create barriers for health facilities with limited resources. Health professionals must be trained in the use and interpretation of digital tools. An overreliance on technology can compromise traditional clinical skills. The use of digital tools for outcome classification raises ethical issues regarding informed patient consent, manipulation of data, and use of information for commercial purposes.

The work carried out on the classification of training engineering results using digital tools for patients treated by dialysis method offers significant advantages in terms of personalization of care and medical decision-making. However, these benefits must be balanced with concerns related to data security, reliability, cost and ethics. A thoughtful and ethical approach is key to maximizing benefits while minimizing potential harms.

## 9. CONCLUSION

The classification of training engineering results using digital tools in the context of patients treated by dialysis method represents an innovative and promising approach to improve the care and quality of life of these patients. This study demonstrates the power of digital technologies in analyzing and understanding complex patient health data, paving the way for more personalized care and targeted interventions. The combination of training engineering and digital tools allows results to be classified according to relevant parameters, such as health indicators, treatment responses and progression trends. This classification offers a holistic view of patient health, facilitating informed medical decision-making and the implementation of preventive interventions. The key advantage of this approach is its ability to anticipate individual patient needs. By using classification models based on real-time data, healthcare professionals can identify at-risk patients, adjust treatments accordingly, and improve overall quality of life. In addition, the classification of results contributes to better communication between healthcare professionals and patients, thus promoting the active engagement of patients in their own care. However, it is essential to consider the challenges related to the confidentiality and security of medical data. Protecting patients' personal information should be a top priority when collecting and analyzing data. Classification of training engineering results using digital tools offers an innovative way to understand and improve the care of patients on dialysis. This personalized approach, based on evidence and evidence, promises to bring significant improvements in the quality of life and health of patients, thus contributing to the evolution of health care towards more effective and targeted solutions.

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## 10 LIMITATIONS OF STUDY AND PROSPECTS

This Research can be limited by the lack of consistent, high-quality data from different medical sources. The reliability of the results strongly depends on the quality and consistency of the available data. Patients treated with dialysis can show great variability in terms of medical conditions, age, comorbidities, etc. This heterogeneity can make the classification complex and less generalizable. Patient samples used in studies may be biased due to specific selection criteria, which may limit the generalizability of results to the general dialysis population. Digital technologies are changing rapidly, which can make searches obsolete as new technologies and methods are developed. Approaches based on digital tools can be addictive, which can pose problems if IT systems experience technical problems or if health professionals are not trained in their use.

Regarding the Perspectives of research on the classification of training engineering results using digital tools for patients treated by dialysis method, it is about artificial intelligence can be used to improve the accuracy of the classification by identifying complex patterns in patient data and providing recommendations based on those patterns. Integrating data from multiple dialysis centers can provide results that are more generalizable and representative of the dialysis population as a whole. Future research could focus on a longitudinal analysis of outcomes, following the progress of patients treated with dialysis over an extended period. Outcome classification methods must be rigorously clinically validated to ensure their usefulness and relevance in medical decision-making. Future research could further explore the incorporation of individual patient preferences and needs into outcome classification for more personalized management. Research on the classification of training engineering results using digital tools for patients treated by dialysis method is still evolving. Future prospects aim to overcome current limitations by using more advanced approaches, integrating AI and adopting a more patient-centric approach, to provide more accurate, relevant and useful results for medical management.

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