

## Special Article

# Quality of Healthcare Services Provision in the Departments of Nuclear Medicine

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## Abstract

**Introduction:** Services in the field of health, but also services in other fields in general, have a special set of characteristics, such as being intangible, which makes their quality evaluation challenging. Although healthcare is described as a service, it is significantly different from other industries at services sector.

**Objective:** The objective of this review is to investigate the quality of health services provided in nuclear medicine departments during the performance of diagnostic tests on patients.

**Methodology:** The study material is consisted of recent articles on the research question found mainly in the Medline electronic database and the Hellenic Academic Libraries Association (HEAL-Link).

**Results:** Initiatives and activities for quality improvement at the nuclear medicine laboratory, should emphasize the accuracy and effectiveness of patient care, patient and staff safety, and build on patient experience during healthcare service provision. Improving quality in nuclear medicine laboratories can potentially reduce the number of imaging tests that need to be repeated due to poor quality, increase diagnostic accuracy, reduce radiation exposure, increase patient satisfaction, and save resources.

**Conclusions:** Adopting a quality management system should be a strategic decision in a nuclear medicine department. The department should implement, document, and maintain a quality management system.

**Keywords:** quality, service provision, health, nuclear medicine.

## Introduction

Services in the field of health, but also services in other fields in general, have a special set of characteristics, such as being intangible, which makes their quality evaluation challenging. Although healthcare is described as a service, it is considered significantly different from other

industries at services sector (McLaughlin, 2006). Certain dimensions of health service quality, such as consistency, completeness, and effectiveness, are also difficult to measure, other than subjective evaluation by the client. But even subjective evaluation by the client can be difficult and the results will be different from the evaluation of

services performed by other parties, such as health professionals (Pai et al., 2016). Continuous monitoring of health services for quality evaluation is very important, so the evaluation of patients' perceptions of the quality of health care, has received significant attention in recent years. Patients' comments and opinions or clients' 'voices' influence quality improvement and provide to the healthcare organizations an opportunity for organizational learning (Alhassan et al., 2015)

In recent decades, the importance of providing the best medical services as well as the need for their standardization has been increasingly recognized among healthcare providers and patients. Health facilities around the world implement systems to improve their quality and enhance patient satisfaction. Quality improvement is a standard process for reviewing and improving performance through data analysis. The primary goal of quality improvement is to enhance patient care (Legido-Quigley, 2008). Quality improvement initiatives and activities in a nuclear medicine laboratory should emphasize the accuracy and effectiveness of patient care, patient and staff safety, and build on patient experience during care. Improving quality in a nuclear medical laboratory can potentially reduce the number of imaging tests that need to be repeated due to poor quality, increase diagnostic accuracy, reduce radiation exposure, increase patient satisfaction, and save resources (Kourkouta et al., 2021)

**Objective:** The objective of this review is to investigate the quality of health services provided in nuclear medicine departments during the performance of diagnostic tests on patients.

### Materials and Methods

This study consists of Greek and international literature. The study's material consists of articles related to the research question. Articles were searched in Greek and international databases such as Google Scholar, the Hellenic Academic Libraries Association (HEAL-Link), and with the use of keywords such as quality of services provision, nuclear medicine, provision. The exclusion criteria for the articles were the language, except for Greek and English. For the most part, only articles and studies accessible to authors were used.

**The Quality of services in the Departments of Nuclear Medicine:** The quality of services in nuclear medicine departments has been studied in

various inquiries to date. The evaluation of quality in these surveys has been done using different tools, but also based on the views of different groups, i.e., patients and employees. In these surveys, not only the overall perception of quality has been evaluated, but also the factors that influence it (Iliadis et al., 2021 & Garcia-Burillo et al., 2012). Although many researchers argue that the "real" quality of a service cannot accurately reflect patients' perceptions, patients will always draw their own conclusions about the quality of a service. In the field of healthcare management, patients' perception refers to perceived quality, as opposed to the actual or absolute quality that require critical management. Therefore, health care providers are under constant pressure to provide quality health services (Hinson et al., 2019).

In a study, De Man et al., (2005) investigated how patients' waiting times affect their perceptions of the quality offered by nuclear medicine departments. Their perceptions were evaluated with the Servqual tool, while both objective and subjective data were considered in terms of waiting times. The waiting time was further divided into three categories, namely the waiting time until the administration of the drug, the waiting time before the diagnostic imaging and the total waiting time. Initially, the comparison between the subjective and objective data of the waiting times showed that the patients underestimated the waiting time before the administration of the drug and the total waiting time, while they overestimated the waiting time before the diagnostic imaging. Regarding the effect of waiting times on quality of the service, the results showed that the total subjective waiting time had a greater impact on the dimension of reliability, compared to the other dimensions of quality of the service based on the Servqual model. Providing information on the reasons for the delay significantly affected the perception of reliability (De Man et al., 2005)

In another study, Vicente et al., (2007), assessed the levels of patient satisfaction and dissatisfaction from a nuclear medicine department. The questionnaire used, assessed the different department quality dimensions related to waiting times for diagnostic imaging, information provided to patients, facilities, level of staff attention to patients and overall patient satisfaction (numerical scale, 1- 10). High levels of satisfaction were recorded among patients, in

terms of the level of staff attention to patients, the provision of information and facilities, while the overall satisfaction received a score of 7/10. Waiting times, on the other hand, were the factor that contributed the most to customer dissatisfaction (Vicente et al., 2007)

Reyes-Pérez et al., (2012) investigated the perceived quality and patient satisfaction levels of nuclear medicine services in the United Kingdom. The National Health Service of the United Kingdom to collect their data created a questionnaire. The overall satisfaction rating received an average score of 8.96 (scale 1-10). The most important variable that affected the overall satisfaction of the patients was the general impression of the organization of the service. The strong points of the quality of the services were the courtesy, the general organizational image, and the cleanliness. The main areas where improvements were needed were the appointment process and the waiting list. The study did not find significant differences in the overall level of satisfaction, in relation to the social and demographic data of the patients (Reyes-Perez, et al., 2012)

In Saudi Arabia, Ahmed et al., (2019) recently studied patient satisfaction from a nuclear medicine department in a healthcare facility. The results showed that the courtesy of the staff of the department, the confidentiality of the examination and the guaranteed confidentiality of the treatment marked the highest average satisfaction scores recorded by the patients. On the other hand, the options of hours and days for appointments, the number of seats available in the waiting room and the cleanliness of the bathrooms gathered the lowest average score. The evaluation of the quality of services offered in nuclear medicine departments is often based on parallel surveys of patients and employees, in order to identify gaps in quality, based on the way the above two different parties perceive it (Ahmed et al., 2019).

For example, De Man et al., (2005) after studying and identifying the key dimensions of service quality in nuclear medicine, and then they compared quality perceptions of the above dimensions between patients and staff. Regarding the first object of the study, not all five dimensions of the SERVQUAL tool were identified, as the dimensions of quality. In particular, the dimensions of tangible elements and assurance were classified as one dimension, while the

dimension of empathy was divided into two sub-dimensions, empathy, and convenience. In all dimensions, the quality scores in the way the staff perceived them were lower, compared to those of the patients, except for the empathy dimension. This in short means that employees tended to perceive that they were providing a lower level of quality of service compared to what patients perceived to be receiving. The results also showed that patients' perception of service quality was correlated with patient satisfaction, especially in terms of reliability and security (De Man et al., 2005)

In the study, Rodrigo-Rincon et al. (2015) evaluated differences in perceptions of quality in nuclear medicine departments between staff and outpatients. Two different tools were developed to examine the perceptions of quality of the two groups above, which used the same 25 categorical data to measure the quality of services. The results showed that patients' perceptions of quality were generally higher than those of employees, as the average value of overall satisfaction with the tool for employees was 6.9 points, while the corresponding score for patients was 9 points (Rodrigo-Rincon et al., 2015)

**Management and Quality Control of Imaging Equipment:** The quality and reliability of imaging equipment is vital in the practice of nuclear medicine. After installation and before clinical use, any nuclear medicine instrument or equipment should undergo a thorough and careful acceptance test to verify that it is operating in accordance with its specifications and clinical purpose. (Papp, 2018 & Williw, 2021)

Each instrument has a set of basic specifications, which are formulated by the manufacturer according to standard test procedures, which are recorded in standard protocols, such as those published by the National Electrical Manufacturers Association (NEMA) in the US or the International Electrotechnical Commission (IEC) in Europe. Additional tests are usually required to test individual components of the instrument in more detail. The results of these tests serve as reference data for future quality control tests, and some may be repeated periodically, such as on a semi-annual or annual basis, or whenever significant changes are made to the services provided (Iliadis et al., 2021 & Sokole et al., 2010 & Dondi et al., 2013 & Dondi et al., 2018). Once instruments are acceptable for

clinical use, their performance should be regularly monitored by simple quality control procedures, which are sensitive to changes in performance. Nuclear medicine instruments are particularly sensitive to environmental conditions and therefore require strict control of temperature and humidity, as well as continuous and constant supply. (Collins, 2000).

Appropriately, trained personnel should perform evaluation tests, and there should be recorded protocols with detailed operating procedures for this routine control procedure. All test results must be recorded and monitored for deviations from the desired performance and the necessary actions should be taken in case of such deviations (Sokole et al, 2010 & Dondi et al, 2013 & Dondi et al, 2018). The records of the results of the above tests should be kept in a physical diary or digital file. Immediate review of quality control results is necessary to compare the measured performance with the standards. The performance limits should be set locally, taking into account the manufacturer's recommendations and other professional instructions. When the evaluation of the equipment indicates performance values that are marginally close to the allowable ones, a decision must be made as to whether the instrument is suitable for use (Kourkouta et al, 2021 & Jung et al, 2015)

The quality control process in the equipment should make clear the actions to be taken when a performance value limit is exceeded, and it should be defined who is responsible for the decision to use the equipment. The resulting performance problems as well as their solutions should also be recorded, as they may be useful for future problems. Guidelines from national and international organizations set the purpose of the tests, the type of tests and the frequency with which they are performed for each instrument or other equipment in nuclear medicine (EANM, 2017 & IAEA, 2015)

**Conclusion:** Adopting a quality management system should be a strategic decision in a nuclear medicine department. The department should implement, document, and maintain a quality management system. (Geraedts et al, 2001) The design and implementation of a quality system is influenced by the needs and limitations, the specific objectives, the nature of the services provided, the procedures used and the size and structure of the nuclear medicine department. Its

effectiveness should be continuously improved in accordance with the requirements of professional and regulatory bodies, as well as standardization and accreditation bodies. A quality system should therefore enable a nuclear medicine department to meet the expectations set out in the quality policy and to satisfy its customers.

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