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REVIEW

# Identifying Patient Satisfaction Determinants in Hemodialysis Settings: A Systematic Review

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**Purpose:** Patient satisfaction is a measure of care quality that assists providers in determining the effectiveness of their services while meeting patients' expectations. This study aimed to review existing studies that have focused on patients' satisfaction determinants in Hemodialysis (HD) settings.

**Methods:** Electronic databases (PubMed, ScienceDirect, Scopus, and Google Scholar) were searched from 2000 onwards to identify studies using search terms related to patient satisfaction and hemodialysis centers. Article review was limited to studies written in English. A total of 19 articles were included by following the PRISMA statement. Data were extracted using a structured form and summarized in a tabular format to identify different determinants that showed a relationship with patient satisfaction. Determinants were classified into provider-related determinants and patient-related characteristics.

**Results:** Provider-related determinants of patient satisfaction in HD centers include staff, facility, service, and treatment. Patient-related characteristics associated with satisfaction include demographics and health status history. Based on this systematic review, key correlates of patient satisfaction in hemodialysis centers include: staff, facility, service, treatment, patient's demographics, and health status.

**Conclusion:** The findings of this study can help healthcare facilities in taking measures in line with the specified determinants to enhance patient satisfaction and improve the organizational performance of the healthcare centers. It is important to constantly study and improve these determinants based on patient feedback to improve patient satisfaction and quality of care.

**Keywords:** hemodialysis patients, patient satisfaction, patient experience, healthcare quality

## Introduction

Healthcare delivery is a co-creation process between providers and patients. Therefore, understanding patients' characteristics, their needs, and requirements is as important as measuring provider performance to evaluate the healthcare quality.[1] Patient satisfaction assessment is becoming highly prevalent in healthcare services and an essential part of their quality improvement. It is proven that improved patient satisfaction leads to better healthcare-related quality of life,[2] improves clinical outcomes, and reduces the number of readmissions. It also changes the patients' behavioral intentions like the complaints on service,[3] their loyalty, and recommendation to others.[4] Thus, better patient satisfaction results in improved organizational performance as it reduces cost and increases the revenue, in addition to the improvement in the reputation of the healthcare facility.[5]

Patient satisfaction assessments are subjected to and influenced by patient expectations. They measure the extent to which the healthcare experience and the patient's perceptions of the received service met their expectations.[6] The process of assessing patient satisfaction is usually done by conducting surveys that assess different determinants.[7] These determinants are classified into patient-related characteristics or provider-related determinants. Understanding these determinants and to what extent they affect patient satisfaction can help healthcare providers in identifying the areas that need improvement for better quality of care.[1]

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Due to their critical role in the healthcare quality, several studies in the literature investigated patient satisfaction determinants. A variety of patient satisfaction frameworks were defined by international institutes such as the NHS and HCAHPS and different healthcare settings vary in their prioritized determinants.[8] One of the challenging settings is related those who receive in-center hemodialysis treatment. Hemodialysis patients go through a complex treatment journey. The typical prescription for dialysis therapy is three times a week which requires the patients to visit the center frequently, deal with different staff members, stay in the center for long periods, and consult and follow-up with different physicians, nurses, and technicians.[9]

Despite the rapid increase in the numbers of dialysis patients seeking treatment in hemodialysis centers, few papers have conducted a systematic review of hemodialysis patients' satisfaction determinants and to better understand patients' needs in this care setting.[10,11] To our knowledge, no prior systematic studies explored the determinants that hemodialysis patients care about and expect during their treatment journey. To address this unmet need and advance understanding of how determinants affect hemodialysis patients' satisfaction, we aimed to identify and review the determinants that influence patient satisfaction in hemodialysis settings in a systematic manner. Our goal is to guide decision-makers in improving their patient experience design by understanding their patients' needs and the requirements for better satisfaction.

# Methodology

This study reports an overview of the literature on patient satisfaction determinants in hemodialysis settings. This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement's recommendations.[12] The PRISMA statement contains a checklist for systemic evaluations that ensures transparency, iteration, and full reporting. The checklist of this review is presented in the Appendix.

## Search Strategy

The studies included were primarily concerned with patient satisfaction determinants in hemodialysis settings. The following databases were used to conduct the literature search: PubMed, ScienceDirect, Scopus, and Google Scholar. The search included primary research papers published in peer-reviewed journals and written in English from 2000 onwards. The search terms used were (Patient experience AND hemodialysis center) OR (Patient satisfaction AND hemodialysis centers) OR (Patient satisfaction determinants AND hemodialysis centers) OR (Patient satisfaction factors AND hemodialysis centers) OR (Hemodialysis satisfaction Domains) OR (Quality of health services AND hemodialysis centers).

## Eligibility Criteria and Selection of Studies

Research articles were included considering the following in their content: patient satisfaction determinants with hemodialysis services, patients' characteristics associated with their satisfaction in hemodialysis centers, and literature review, systematic review, or meta-analysis on hemodialysis patient satisfaction determinants. Conference papers, non-English papers, papers that focused only on one type of treatment, and those that focused only on satisfaction instruments without reporting findings on patient satisfaction were excluded.

## Quality Assessment

The systematic review process was carried out in an equitable and unbiased manner. The first phase involved determining the relevance of each paper by reading the title and abstract. Following that, a second screening procedure was carried out, which included reading the entire text of each paper to determine its eligibility. Among the papers found in the literature, after shortlisting the number of searches, 31 papers had almost all the considered factors and among them, some were removed because of factors such as repetition or unclear methodology, and finally, 19 articles were selected for this review study. A flow diagram of the study selection is shown in Figure 1.

## Data Extraction and Data Analysis

After determining the relevant studies in terms of titles and content, we extracted data into a tabular form. The extracted data included study information (author name, year of publication, country), sample details (number of participants, characteristics), study design (data collection tool, data analysis methodology), determinants (satisfaction domains and

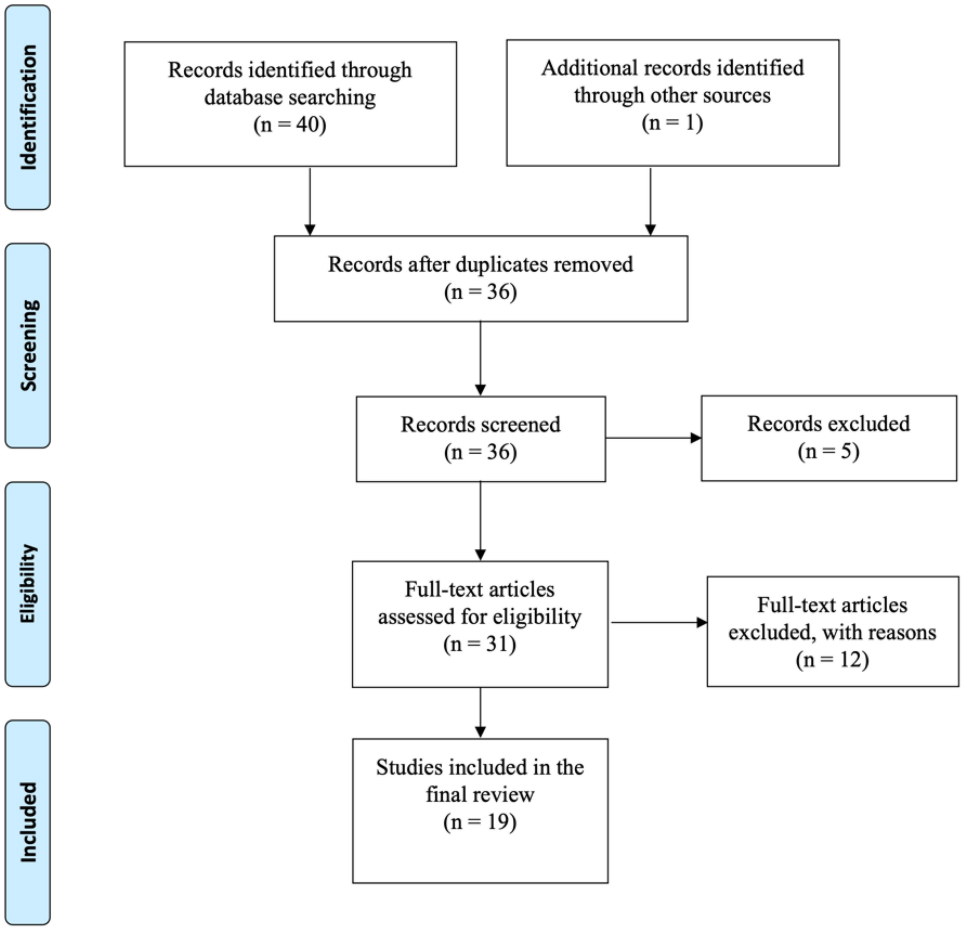


**Figure 1** Study selection flowchart.

factors), outcomes (patient characteristics and satisfaction association, patient satisfaction levels). A summary of the included studies is displayed in Table 1.

## Results

Table 1 summarizes the 19 studies related to hemodialysis patients' satisfaction determinants. More than 50% of the studies were from the United States (US) followed by Australia and Egypt with two studies each. The rest of the studies were from different parts of the world such as Japan, Canada, Taiwan, Philippines, and Italy. In terms of data collection tools, a variety of them were used ranging from self-administrated tools to internationally developed surveys such as In-Center Hemodialysis Consumer Assessment of Healthcare Providers and Systems (ICH CAHPS) survey, and Choices for Healthy Outcomes in Caring for End-Stage Renal Disease (CHOICE) questionnaire. Collected data were analyzed utilizing different methods like descriptive analysis, Pearson's correlations, Spearman analysis, Chi-Square test, and Context-mechanism-outcomes (CMO) diagram. In addition to that, regression analysis, multiple logistics regression, and linear regression were employed.

As presented in Table 1, a wide range of determinants influencing patients' satisfaction in hemodialysis settings were discussed in the literature. These include provider-related determinants and patient-related characteristics. During the analysis, we qualitatively subcategorized the provider-related determinants into staff, facility, service, and treatment to better understand possible variation in such factors' importance in patient satisfaction. Patient-related characteristics could be patient demographics and health status history. The determinants and their relationship with patient satisfaction are then discussed in detail.

**Table 1** Characteristics and Findings of the Selected Studies

| Authors | Sample Size | Methodology | | | | Determinants | Results |
|---|---|---|---|---|---|---|---|
| | | Country of Study | Participants' Characteristics | Data Collection Tool | Data Analysis | | |
| (Koon, 2020)[13] | Patients: 345<br>Nurses: 94 | Philippines | • Nurses with minimum of 3-month experience in HD<br>• 18 years old patients or older<br>• Regular treatment sessions for the last 3 months in the same center<br>• Good mental abilities and hemodynamically stable | • Practice Environment Scale of Nursing Work Index (PES-NWI)<br>• Caring Factor Survey-Tagalog (CFS-T)<br>• Patient Satisfaction of Nursing Care Quality Questionnaire-Tagalog (PSNCQQ-T) | • Descriptive cross-sectional design<br>• Spearman correlation | Nurse caring behaviors | • There is a significant link between nursing caring behavior and patient satisfaction<br>• The level of patient satisfaction with nursing care was excellent<br>• - High scores were given to nurses caring activities by HD patients |
| (Dad, Grobert and Richardson, 2020)[14] | - | United States | - | In-Center Hemodialysis Consumer Assessment of Healthcare Providers and Systems (ICH CAHPS) survey | A practical review paper | • Nephrologists' Communication and Caring (NCC)<br>• Quality of Dialysis Center Care and Operations (DCO)<br>• Providing Information to Patients (PIP) | • Higher satisfaction levels were linked with less waiting time, provided information, quality of dialysis staff, center rating, regular interaction with nephrologist, smaller facility size, and more nursing staff per patient |
| (Harwood et al, 2020)[15] | Patients/ family members: 12<br>HD nurses: 7<br>Rehabilitation staff: 43 | Canada | • Patient and/ or family members<br>• HD staff<br>• Rehabilitation care staff | • Interviews<br>• Focus groups<br>• Online surveys | Context-mechanism-outcomes (CMO) diagram | • HD service in rehabilitation facilities<br>• Dialysis team communication with rehab staff<br>• Cost<br>• Calm and pleasant environment of the dialysis unit | • Enhanced patient experience, quality of life and health outcomes, communication, and reduced costs while providing on-site HD services, as well as a calm and pleasant environment of the HD unit.<br>• Patients were less fatigued with less travelling distances<br>• Major costs saving in medical transportation between the two organizations |

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|---|---|---|---|---|---|---|---|
| (Morgan et al, 2019)[16] | Patients: 66 | Australia | Patients in a hemodialysis unit | Self-administered questionnaire | • Descriptive statistics,<br>• $\chi 2$ test<br>• COM-B model<br>• Theoretical Domains Framework (TDF) | • Behavior of dietitians<br>• Patients' interaction and consultation with dietitians<br>• Delivering nutrition information through consultation on dialysis | • Positive satisfaction with earlier interaction with dietitians<br>• Making changes in the diet plan after seeing a dietitian has a negative impact<br>• Providing dietetics services for dialysis patients where and when needed by the patient not at prescheduled intervals.<br>• Telemedicine was not preferred with most of the patients |
| (Kshirsagar et al, 2019)[9] | Dialysis clinics: 3176 | United States | Adult patients with ESRD among different clinics | • ICH-CSHPS survey<br>• Star Rating<br>• Quality Incentive Program (QIP) | • Descriptive statistics<br>• Regression model<br>• Ordered logit model<br>• Linear regression model | • Nephrologists<br>• Dialysis facility<br>• Information transmission<br>• Facility Quality | • Direct association between patient satisfaction and dialysis facility quality, in both measurements QIP and star ratings<br>• Stronger relationship with QIP and star ratings for dialysis facility and information transmission than nephrologists' assessment domains |
| (Chen et al, 2018)[2] | Patients: 250 | Taiwan | • 18 years old patients or older<br>• Patients receiving HD treatment for at least 3 months | • Health Care Climate Questionnaire (HCCQ)<br>• Self Determination Theory (SDT)<br>• HRQOL | • Structural Equation Modeling (SEM)<br>• Confirmatory Factor Analysis (CFA)<br>• Chi-square test | • Autonomy Support | • High satisfaction in patients basic needs is associated with perceiving autonomy support<br>• The higher level of basic needs satisfaction leads to higher HRQOL |

(*Continued*)



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**Table 1** (Continued).

| Authors | Sample Size | Methodology | | | | Determinants | Results |
|---|---|---|---|---|---|---|---|
| | | Country of Study | Participants' Characteristics | Data Collection Tool | Data Analysis | | |
| (Dad et al, 2018)[17] | Patients: 3369 | United States | • 18 years old patients or older<br>• Patients receiving HD for at least 3 months | • ICH-CAHPS survey.<br>• DCI medical information system | Cross-sectional analysis using logistic regression | • Patient demographic (Age, gender, race, education level)<br>• Treatment characteristics – duration<br>• Nephrologists' Communication and Caring (NCC)<br>• Quality of Dialysis center Care and Operations (DCO)<br>• Providing Information to Patients (PIP) | • A higher dialysis clearance was linked to a higher NCC<br>• Treatments that were cut short were linked to lower NCC<br>• A lower educational level was linked to a higher DCO<br>• Using phone rather than mail to administer yielded higher scores of PIP<br>• PIP scores were lower in older patients<br>• Higher ratings of nephrologists, dialysis nurses, and dialysis facilities were correlated with older patients and telephone administration |
| (Ladin et al, 2017)[18] | Patients: 31 | United States | • Patients receiving maintenance dialysis for over a month<br>• Patients above 65 years.<br>• English speaking<br>• Consenting ability | Patients' interviews | Qualitative analysis | • Decision-making experience and choice to initiate dialysis<br>• Patients received the choice of their dialysis modality<br>• Patient engagement | • Dissatisfaction with the lack of patients' options in starting dialysis<br>• Low patient satisfaction due to impacting patient's preferences<br>• High patients' satisfaction with ability to choose their dialysis modality<br>• Low treatment satisfaction was linked to poor decision-making experiences |
| (Coleman et al, 2017)[19] | Patients: 561 | Australia | • 18 years old patients or older<br>• Patients with CKD (non-dialysis) who attended CKD nurse-led clinics over six months | • Demographic assessment<br>• CKD-Nurse Practitioner Patient Satisfaction Questionnaire | • Descriptive statistics<br>• Kruskal–Wallis test<br>• Chi Square test<br>• Spearman correlation coefficient | • Access to service<br>• Care coordination<br>• Satisfaction and safety<br>• Quality of service | • High patient satisfaction of nurse-led clinics<br>• A variation in patients' responses between different gender and age group.<br>• Nurses-patient discussion questions vary based on gender and age group.<br>• Communication is critical, and car-parking, more practical support, and having accessible locations needs improvements |

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|---|---|---|---|---|---|---|---|
| (Bayoumi, Guindy and Ahmed, 2016)[20] | Patients: 79 | Egypt | • 18 years old patients or older<br>• Patients receiving HD for at least 3 months | PS18 Questionnaire | Cross-sectional study testing correlations | • Patient demographic (sex, age, social status, education level and work)<br>• Ease to access<br>• Time spent with the doctor and communication<br>• Financial aspect<br>• Technical quality<br>• Interpersonal manner | • Satisfaction level is positively correlated with financial aspects, interpersonal manner, communication, and time spent with the doctor which is correlated with accessibility and convenience.<br>• Technical quality is positively related to time spent with the doctor, communication, and accessibility and convenience |
| (Richardson et al, 2015)[21] | Patients: 8213 | US | • Patients aged 18 years old or older<br>• Receiving treatment for at least 3 months | DCI Clinic Report Card | • Spearman correlation coefficients<br>• Logistic regression<br>• Mixed model | • Patientdemographic (gender, race, age, health status) | • Overall satisfaction was linked to patient age, race, vintage, and missed or shortened treatments in the past |
| (Gu and Itoh, 2015)[4] | Patients: 807 | Japan | Dialysis patients | Self-administered questionnaire | • Principal component analysis<br>• Stepwise regression analysis | • Treatment and therapy<br>• Information provided<br>• Interpersonal relations<br>• Reception<br>• Environment and equipment<br>• Staff responsiveness<br>• Staff skills and expertise | • Patient satisfaction is correlated with provided information, interpersonal relations, reception. Also, environment, and tools, and treatment and therapy being critical determinants.<br>• High association between patients' quality of life and the overall satisfaction that is associated with high loyalty |
| (Donia et al, 2015)[22] | Patients: 69 | Egypt | Patients who received 3 HD sessions regularly | 3 Sate questionnaire | Descriptive analysis | • Staff (physicians, nurses, and workers)<br>• Environment<br>• Food<br>• Waiting time | • Food has the least excellent evaluation<br>• Physician's performance had the highest evaluation |

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https://doi.org/10.2147/RMHP.S372094

**Table 1** (Continued).

| Authors | Sample Size | Methodology | | | | Determinants | Results |
|---|---|---|---|---|---|---|---|
| | | Country of Study | Participants' Characteristics | Data Collection Tool | Data Analysis | | |
| (Palmer et al, 2014)[23] | Patients: 1846 | Europe and America | • Patients treated in HD<br>• 18 years old patients or older | Choices for Healthy Outcomes in Caring for End-Stage Renal Disease (CHOICE) questionnaire | Multilevel logistic regression | • Staff performance and attitude<br>• Ease to access and reach<br>• Information transaction<br>• Gender<br>• Health status and history<br>• Education level<br>• Age<br>• Social status | • Patients require more accurate information<br>• Treatment country is not related to the satisfaction.<br>• Perception of care is influenced by the patient's age and depressive symptoms, but not demographics and clinical features<br>• Positive relationship between dialysis care performance level and overall patient satisfaction |
| (Chenitz, Fernando and Shea, 2014)[24] | Patients: 30 | United States | • Patients treated in HD for at least 6 months<br>• 18 years old patients or older<br>• English speaking | • Semi structured interview following Behavioral Model of Health Services Use<br>• Close-ended questions<br>• SF-12 | • Fisher's exact test<br>• Wilcoxon rank-sum test<br>• Analyzing verbatim | • Connection to peers at dialysis unit<br>• Care provided by the physicians<br>• Information provided<br>• Child Care and facility services<br>• Treatment scheduling and transportation availability | • Patients connected to peers were emotionally connected, and able to articulate concerns.<br>• Transportation was a common problem<br>• Decision to attend treatment was influenced by education from the health care team, and motivation or competing priorities. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (Argentero, Dell'Olivo and Ferretti, 2008)[25] | Staff: 402<br>Patients: 695 | Italy | • Staff (nurses and physicians)<br>• HD patients of March 2005 | • Maslach Burnout Inventory assessment to assess the staff burnout - nurses<br>• A self-administered questionnaire – patients | • Descriptive analysis<br>• Factor analysis.<br>• Analysis of variance<br>• Correlational analysis (Spearman) | • Communication of Information<br>• Relationship with health care staff<br>• Staff performance<br>• Organizational aspects of health care service<br>• Emotional Exhaustion<br>• Depersonalization<br>• Personal Accomplishment | • Patient satisfaction is<br>• Directly related to staff personal accomplishment.<br>• Negatively correlated with staff emotional exhaustion<br>• No correlation with staff depersonalization<br>• High levels of burnout in physicians and nurses are associated with poor patient satisfaction in HD centers |
| (Juergensen et al, 2006)[26] | PD patients: 62<br>HD patients: 84 | United States | • 18 years old or older<br>• Continued the same HD modality for at least 6 months<br>• Fluent in English<br>• - Medically stable for at least 2 months before the study without acute medical complications | Self-administered questionnaire | • Charlson Comorbidity Index (CCI) scores<br>• Statistical analysis including *t*-test, Pearson correlation, and regression | • Staff interactions<br>• Frequency of medical care<br>• Social interaction with other dialysis patients<br>• Ability to do treatment at home<br>• Ability to do treatment while sleeping<br>• Length of treatment<br>• Availability of supplies | • PD patients' satisfaction was higher than HD patients<br>• In general, PD patients were more satisfied with their care and their treatment has lower impact on their lives than HD patients |
| (Rubin et al, 2004)[27] | Patients: 656 | United States | • HD patients<br>• Mean age of 54 years. | Medical Outcomes Study 36-Item Short-Form Health Survey (MOS SF-36) | Multiple logistic regression analysis | • Staff availability<br>• Technical quality<br>• Interpersonal Treatment<br>• information and coordination<br>• Response to pain<br>• Social worker availability | • The High scores for nurses' and dialysis staff's care, hygienic conditions, pain response, and availability during emergencies<br>• Poor score for coordination between nephrologists and other physicians, frequency of seeing the patient and accuracy of information<br>• Overall treatment rating is outstanding |

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**Table 1** (Continued).

| Authors | Sample Size | Methodology | | | | Determinants | Results |
|---|---|---|---|---|---|---|---|
| | | Country of Study | Participants' Characteristics | Data Collection Tool | Data Analysis | | |
| (Kovac et al, 2002)[28] | Patients: 79 | United States | • Age 20 to 85 years<br>• Patients treated from 4 to 244 months | Patients' interviews | Pearson's correlations | • Information provided<br>• Physician caring<br>• Staff responsiveness | • Patient satisfaction improved with more provided details<br>• Lower dialysis attendance was associated with dissatisfaction<br>• Critical role of nephrologist in patient compliance.<br>• Patients care about physicians more than other staff. |

Given the aim of this study of exploring the patient satisfaction determinants in hemodialysis settings, we identifed different factors and discussed them further in the following categories.

## Staff

Healthcare staff in hemodialysis centers play a major role in patient satisfaction. This is not surprising, as in-center hemodialysis requires on average three sessions weekly, with interactions with a variety of staff including nephrologists, nurses, technicians, social workers, dieticians and other team members. Different staff-related determinants were found that influence patient satisfaction.

Information provided by the staff is a critical determinant of hemodialysis patient satisfaction. Educating patients and their families about the disease, the current situation of the patient, the treatment options and their consequences, and the long-term impact on the patient quality of life are critical factors for hemodialysis patients.[4,14,28] By providing clear and complete information, patients gain a clear picture of their condition that allow them to be involved in treatment decisions. Therefore, patients receive the feeling of being in control, connected, and competent, factors that are directly related to patient satisfaction.[2] In different studies, it was shown that lack of the patient's choices to initiate dialysis treatment and ineffective decision-making experiences were related to low patient satisfaction.[18,23] It was also noted that patients' attention to detail increases with time, which requires more information and focus from the staff to maintain their satisfaction.[25] In addition to that, patient satisfaction is positively influenced with the facility quality that is strongly associated with information transmission.[9]

Moreover, physician communication and caring skills such as listening to the patients effectively, respecting them, and interacting with them have a great effect on the overall hemodialysis patient satisfaction. Giving the patient enough treatment time is an essential aspect of communication and caring, and it results in higher staff communication and care scores[17] and thus, increases patient satisfaction.[20] It was also found that nursing caring behavior has a significant direct relationship with the patient satisfaction level.[13] Better communication between staff and patients leads to a clear understanding of the patients' concerns and needs, where the opposite could result in patient frustration, isolation, or disempowered feeling.[29] Besides, patients with kidney failure are usually required to follow up with different physicians in different settings that make the internal communication between the staff a major satisfaction factor, in addition to the staff availability and responsiveness to the patients' pain.[27]

Relationship building has many positive outcomes such as patient's comfortability, loyalty, and commitment to dialysis sessions[28] and therefore, better clinical outcomes. Interpersonal relations are a crucial determinant for patient satisfaction in hemodialysis centers. However, it is considered the most important determinant in other healthcare settings. This variation could be due to the frequent visits of dialysis patients that leads them in prioritizing other aspects like facility and therapy.[4] Further, studies showed that interpersonal relations established between the staff and the patient have greater impact on patient satisfaction than staff technical skills. This is due to patients taking the staff's technical skills for granted and assessing the quality of healthcare from emotional and interpersonal perspectives.[25,30]

## Services

Patient satisfaction increases in an organization where more attention is given to the quality of provided services, operations, and processes. Different aspects were examined in the literature to assess patient satisfaction with the provided services at hemodialysis centers.

First, patient engagement is becoming more and more important for maintaining patient satisfaction. Patients are demanding better access to providers and more control of their health journey. Giving patients a clear voice in sharing their views of their treatment is important because it helps physicians to learn through dialogue and educational opportunities. Patients who were involved in decision-making had a more optimistic attitude toward dialysis. Poor decision-making experiences, on the other hand, were linked to low treatment satisfaction, which means that patients had limited engagement and choices regarding their dialysis treatment.[18]

Likewise, the center administrative procedure is another service that determines patients' satisfaction with their hemodialysis treatment. The process includes registration, admission, and discharge procedure. If access to healthcare facilities is enhanced, patients would be less disturbed by their treatment. A statistical analysis showed a positive

correlation between the provider's technical quality, and service accessibility as well as convenience that also influence the health care outcomes and satisfaction levels.[20] Delays in administrative procedure lead to longer patients' waiting time that consequently affect their satisfaction level negatively.[14] Patients consider waiting in their healthcare centers as wasted or lost opportunity time.[31] Moreover, the administrative procedure's coordination and follow-up process had a significant impact on patient satisfaction. This included the ease of booking, rescheduling, and patients' communication with their providers between appointments.

Besides, nutrition services play an important role in hemodialysis patients' recovery and well-being. Such services can influence patients' satisfaction with their overall hospital experience. Preparing food with appropriate quality and quantity and engaging patients on hemodialysis with dietetic services increase patient satisfaction. Studies showed that seeing a dietitian since commencing hemodialysis and receiving nutrition attention and care increased patient satisfaction.[16] Another finding reported in the literature was associated with higher patient satisfaction among mothers attending hemodialysis sessions due to the availability of childcare services. Maternity and childcare services helped in creating better clinical outcomes by making it easy for mothers on hemodialysis treatment to attend their sessions.[24]

Transportation availability is another factor that was commonly measured across studies. Since hemodialysis is usually performed three times a week in a facility, the accessibility and availability of dialysis transportation is a major concern for both patients and the healthcare system. Patients may be late or miss their appointments due to the lack of a reliable and effective transportation system. This will result in overcrowding in waiting rooms, with patients rating their experience as poor. According to recent studies, patients rated insufficient transportation as an obstacle to hemodialysis attendance, lowering their overall satisfaction. Moreover, the availability of a reliable shuttle service increased patient satisfaction with their hemodialysis treatment.[15,19,24]

Another study related to transportation and distance from the dialysis center revealed that to achieve an improvement in patient experience and reduction of travel costs, hemodialysis services could be provided on-site in different locations. For instance, when people on hemodialysis also require a rehab program, the hemodialysis services could be provided in the rehab facility setting. Thus, patients do not have to waste their time waiting for transportation to and from hemodialysis centers.[15] The opportunity of providing dialysis services in different locations is a mechanism for success in improved patient experience.

## Facility

Facility is another important determinant that was reviewed repeatedly in the literature. Patients tend to make a first impression of the healthcare center based on the facility location and its internal and external layout even before a service experience begins.

Since dialysis patients visit the center frequently, they must access the facility smoothly without facing any obstacle each time. This highly depends on its location and whether it is near or far from the city center. Another issue that must be taken into consideration is the availability of enough parking slots for patients, medical staff, and visitors. Besides that, a valet parking service might be helpful and timesaving to the patients. A study revealed that the location of the facility was a factor to consider for improving patients' satisfaction, as patients look forward to having easy access to transport and parking availability.[19] In addition, it has been witnessed that patients' time was more efficiently used with reduced travel time allowing for more time for rest when the dialysis service was provided in a calm area.[15]

Another aspect that affects the satisfaction with the facility is its environment. No doubt that cleanliness, hygiene, and quietness are drivers of a pleasant ambiance that all patients look forward to. In addition to that, a bright and calm environment would positively impact the patient experience.[15] It was also found that having a pleasant environment will help dialysis patients to connect with their peers more easily.[24] Similarly, ensuring a safe environment is crucial. Patients' safety must be a top priority to every hemodialysis center, whether in terms of the facility and its equipment or care given by the nurses. It was noticed that nurse discussions with the patient to explain things and address health concerns is a driver of satisfaction with kidney care and it is a way of making the patient feel safe.[19]

Availability of proper resources at the center plays a major role in ensuring a high-quality service that leads to patients' satisfaction. Such factors include equipment, technology, and furniture (chairs, beds, coaches, etc.) found at the different departments and patient rooms in a healthcare center. Consequently, this impacts the physical comfort of

patients. A study in Japan demonstrated that some characteristics of dialysis therapy such as the dialysis equipment affects the satisfaction of patients, as that they must visit the facility thrice a week.[4] This concludes why the physical environment of the facility and equipment used are much more important for dialysis patients than other types of patients.

Another study on adult dialysis patients showed that patients emphasized more comfortable chairs at the dialysis facility would improve their treatment experience, in addition to having better cable television channels for better entertainment.[24]

## Treatment

A primary factor that affects dialysis patients is the treatment process they go through. Although balancing patient preferences and clinical quality can be complex process, existing studies illustrate some themes related to correlates of patient satisfaction.

First, patients' ability to receive treatment at any time and different sites is rising in demand, although this is highly dependent on the mode of treatment. For instance, it has been demonstrated that peritoneal patients are more likely to show a positive response than hemodialysis patients as they can do the treatment at home or while sleeping.[26] Another treatment-related aspect is the frequency of treatment, as well as the duration per treatment session. Patients prefer to have fewer treatment sessions, especially when they are in the center, as this would directly lower their transportation costs. In addition, patients who might feel drained or ill after the treatment in every session are more likely to be less adherent and motivated.[24] As for the duration, hemodialysis patients are less satisfied with how long the procedure is than peritoneal patients.[26] Yet, it is worth mentioning that patients prefer to have shorter treatment duration, but not without a physician's approval and prescription. However, a cross-sectional study, showcased that lower global ratings of nephrologists and dialysis facilities were reported when hemodialysis treatments were at least 15 min shorter than prescribed.[17]

## Patients' Characteristics

Older age was consistently related with higher global ratings for nephrologists, dialysis personnel, and dialysis facilities, but with a lower Providing Information to Patients (PIP) composite score.[17] Another study found that most respondent attributes, except for age and depressive symptoms, had no effect on the overall impressions of care. For instance, older patients were less critical of their hemodialysis care,[25] while patients with depressive symptoms were less satisfied.[23] Furthermore, patient satisfaction level with the provider technical quality aspects at the dialysis unit was highly influenced by patient's gender and marital status.[20] In another study, overall satisfaction with care independently correlated with the hemodialysis patient age, race, vintage, and history of unattended or shortened sessions of treatment. High satisfaction level was found among older patients who were committed to their treatment schedule.[21]

An indirect relationship was found between patients satisfaction and their education level.[17] It was also discovered that patients who did not adhere to their treatment schedule had much fewer years of education than those who did.[24] That negatively influences patient satisfaction.[21,28] The low attendance level can be explained by the fact that people who are more educated are more aware of the consequences that may arise from not attending their treatment and the importance of complying with the prescribed therapy and medication.

# Conclusion

It is a growing challenge for healthcare centers to provide their patients with a care experience that meets their expectations. HD patients are unique in requiring a complex treatment that takes a long time and requires frequent visits to a care center on a regular basis. Hence, the ability of HD centers to provide the best-in-class service that fulfills patients' needs must be specified through the proper definition of determinants essential for patients' satisfaction. To better understand determinants of satisfaction among hemodialysis, we conducted a systematic review in accordance with the PRISMA statement's recommendations.

In this study, we identified determinants driven by providers and patient-related characteristics. Our review showed that staff-patient interaction including information provided, communication skills, behavior, and responsiveness appeared to have a high influence on patient satisfaction. In addition, determinants related to the services provided at HD settings involved patient engagement, administrative procedures, nutrition, childcare, transportation, and onsite

dialysis treatment. Likewise, the facility included its location, parking availability, environment, safety, and equipment. As for the treatment process, mode, availability, frequency, and duration are found to impact patient satisfaction. On the other hand, patient-related characteristics comprise patients' demographics and health status.

A limitation of this review is that it failed to cover all the papers specified in the eligibility criteria as the databases were restricted to accessible resources. Moreover, it included papers written in English only, so papers written in other languages could have more contribution to the outcomes of this paper. Moreover, this study did not include all the parameters of PRISMA review in terms of data quality assessment. For instance, risk of bias in individual studies were not included due to the limited observation and availability in the selected studies. Besides, further research in improvement interventions and best practices in hemodialysis settings would be useful for practitioners and decision-makers.

In conclusion, the determinants of patient satisfaction in the HD settings are diverse and includes many provider and patient factors, but understanding common determinants can help centers focus on improving satisfaction. HD centers should also study and improve the satisfaction determinants specific to their center as per the voice of their patients. Positive patient satisfaction indicates a good care experience leading to a positive word of mouth, recommendations, and a good reputation of the healthcare setting.

## Disclosure

The authors report no conflicts of interest in this work.

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