Designing a method to assess and improve the quality of healthcare in Nephrology by means of the Delphi technique

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ABSTRACT

Background: Free choice is not easy when there is a lack of information. Methods for evaluating quality of care to provide patients with comprehensive and understandable information on hospital departments are therefore necessary. **Objectives:** To draft a methodological proposal for evaluating quality of care of hospital departments, the data of which can provide citizens with useful care quality information. The proposal should be based on consensus and on the experience of medical specialists, defining thus complementary paths to improvement. **Methods:** A Delphi study on the quality of care in Nephrology, comprising three phases: assessment results, necessary means for quality, and importance of medical advice and surveys among specialists. The questionnaire was administered to a panel of 32 nephrologists. **Results:** The nephrologists accepted the outcome criteria on quality of care 55/62 (89%), as well as the proposed means for quality of care 87/92 (95%). 81% of the nephrologists reported the validity and topicality of providing patients with specialist advice as to the most adequate department to better treat their kidney diseases. 86% of the panellists deemed appropriate to include surveys on medical advice as additional criteria for the evaluation of quality of care. **Conclusions:** It is possible to obtain a consensus-based methodological proposal for the evaluation and improvement of quality of care which includes results on quality of care, means for quality of care, and medical advice based on surveys carried out among specialists to identify the best Nephrology departments. This method could provide reliable and understandable guidance for citizens.

Keywords: Hospital care. Quality, access and assessment of healthcare. Consensus. Healthcare quality indicators. Nephrology. Delphi technique.

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Diseño de un método de evaluación y mejora de la calidad asistencial en Nefrología mediante técnica Delphi
RESUMEN

Antecedentes: *La libre elección no es fácil cuando se carece de información adecuada. Para ello son necesarios métodos de evaluación de la calidad asistencial que ofrezcan al paciente una información integral y comprensible de los servicios hospitalarios.* ***Objetivos:*** *Definir una propuesta metodológica para evaluar la calidad asistencial de los servicios hospitalarios, cuyos resultados sirvan para ofrecer una información útil al ciudadano. La propuesta debe fundamentarse en el consenso y en la experiencia de los especialistas médicos y definir complementariamente vías de mejora.* ***Métodos:*** *Estudio Delphi sobre calidad asistencial en Nefrología, estructurado en tres apartados: evaluación de resultados, medios necesarios para la calidad, e importancia del consejo médico y de la encuesta a especialistas. El cuestionario fue cumplimentado por un panel formado por 32 nefrólogos.* ***Resultados:*** *Los nefrólogos aceptaron 55/62 (89 %) de los criterios de resultados en calidad asistencial. También aceptaron 87/92 (95 %) de los medios propuestos para la calidad asistencial. El 81 % de los nefrólogos consideró de actualidad el consejo médico de un especialista a un paciente acerca del servicio donde podrían tratar mejor su enfermedad. Un 86 % creyó oportuno incluir encuestas sobre consejo médico como criterio adicional en la evaluación de la calidad asistencial.* ***Conclusiones:*** *Es posible obtener una propuesta metodológica consensuada para la evaluación y mejora de la calidad asistencial que incluya resultados de calidad asistencial, medios para la calidad asistencial y el consejo médico derivado de encuestas a especialistas para identificar los mejores servicios. Este método podría facilitar una orientación fiable y comprensible para el ciudadano.*
Palabras clave: *Atención hospitalaria. Calidad, acceso y evaluación de la atención de la salud. Consenso. Indicadores de calidad de la atención de salud. Nefrología. Técnica Delphi.*

INTRODUCTION

Spanish Law 41/2002, also known as the Patient Autonomy Law[1], defines free choice as the power of the patient or user to

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choose freely and voluntarily between two or more healthcare alternatives, various doctors and healthcare facilities. It also establishes that patients and National Health System users have the right to receive information on available healthcare departments and units, their quality and access requirements.

However, currently there is not enough information for patients to freely choose between different hospital departments. Therefore, methods are required to assess the quality of care provided by specific hospital departments and generate specific, comprehensive, reliable and easy to understand information for patients.

Hospitals often use different models for managing and improving quality, mainly following the Joint Commission Accreditation Model[2], the ISO certification[3,4], and the European Foundation for Quality Management Model[5]. These models are very useful and, both individually and collectively, provide a lot of information on areas for improvement[6]. Yet, they do not provide data on the specific quality of care provided by each hospital department.

The use of the medical history as a basic source of information may provide data more in line with this aim[7]. This approach uses indicators provided by the Minimum Basic Data Set (MBDS), defined in 1981 for the first time by the European Economic Community, with the support of the World Health Organization and the Hospital Committee of the European Communities. In 1987, the MBDS was endorsed in Spain by the National Health Service Interregional Council and implemented in the different autonomous communities in the early 1990s.

Spain has recently approved the minimum data set for clinical reports[8], which, along with the audits on the quality of clinical coding of diagnoses and procedures, will contribute to greater homogeneity of MBDS-based indicators[9] and will likely increase the reliability of comparative studies between hospitals.

Examples of these indicators are some of those defined and used by the Agency for Healthcare Research and Quality[10], the Organisation for Economic Cooperation and Development[11], the Spanish Society of Healthcare Quality[12], the Ministry of Health[13] and the autonomous communities[14,15]. However, in terms of free choice of specific healthcare departments and units, this great abundance of indicators does not provide enough information on differences between specialties nor provide an overview of the quality of the different healthcare activities carried out in each hospital department.

The main objective of this project was to develop a methodology for assessing the quality of healthcare in specific hospital departments, in order to provide high quality and easy to understand information that allows patients to freely choose specific hospital departments. A second objective was

to define means and channels for improving the quality of healthcare. This method had to be supported by the knowledge and experience of those who know best the quality of care in their departments, that is, medical specialists. Our approach was to define and structure a model for assessing and improving the quality of healthcare[16] and subsequently submit it to specialists for their opinion. We were also motivated by a desire for agreement and consensus, as the only way to achieve stable and lasting paths to improvement.

The recommendations of the Institute of Medicine for redesigning healthcare systems[17], especially those related to improved quality and transparency, also encouraged us to work along these lines.

With this in mind, we considered an assessment method that included two complementary systems, one that assessed the quality of healthcare provided by hospital departments through outcome results and a survey asking medical specialists for the expert opinion on the best hospital departments in each field of medicine. We suggested the survey based on our belief that specialists' opinions should be a new component of quality assessment models, since many patients with serious illnesses ask medical specialists where they can be treated with the best chance of being cured[18]. We also wanted a useful model so we established the complementary requirement of seeking avenues for improving the quality of hospital departments, not only for assessing them. We thought that the usual absence of indicators on structural, human and organisational resources prevented each hospital department from clearly seeing what it should or could do and the path it should follow to improve its quality of healthcare.

To achieve our objectives, we proposed a Delphi study[19-23], since we were seeking first-hand, freely expressed information, and a consensus that could not be interfered with leaders stating their opinion. We started the project with a pilot study in two specialties: one medical (Nephrology) and the other surgical (Otolaryngology).

In this paper, we present the results obtained in the specialty of Nephrology. It is important to highlight the interesting studies published on this specialty[24-26] and specifically on the quality of healthcare in Nephrology[27-32], which were very useful in developing our project.

Amongst the results obtained, we highlight the high rate of participation of the nephrologists involved in the study, which was higher than expected for this type of studies[33,34]. This may reflect a desire to define new methods to assess and improve the quality of healthcare in Nephrology. We also highlight the large number of agreements obtained on indicators for assessing and means for improving the quality of healthcare. Acceptance of the web platform was an essential study tool since it was a major communication facilitator. Its use made defining and reviewing the model easier. Both the expert

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opinion of specialists on the validity of medical advice on the best Nephrology departments for treating different diseases and the agreement obtained on the existing relationship between image or prestige and quality of healthcare, were also significant results.

The most important conclusions were: first, the possibility of obtaining, by consensus, a basic methodological proposal for assessing and improving healthcare quality; and second, the validity of expert opinion by specialists to identify the best Nephrology departments for specific kidney diseases.

METHOD

Study design

A questionnaire was developed to be assessed in a Delphi study by a panel of experts in Nephrology from around Spain. The research team defined and structured a conceptual methodological proposal for assessing and improving the quality of healthcare in Nephrology[11-16,27-32]. The questionnaire was developed over several meetings in which the model and structure were defined, criteria and indicators were selected, the requirements necessary to form part of the expert panel were agreed upon and the minimum consensus for the acceptance of each proposal was established. The study was carried out in two rounds, with a four-week interval, in May and June 2012. The first round included 242 questions grouped into different areas of criteria, of which 203 were multiple-choice. The second round included all of the multiple-choice questions. In the second round, before answering each question, the panellists saw the group response percentages of the first round, as well as their own response, with the aim of facilitating the review of all their responses.

The questionnaire was administered to the experts through a web platform specifically designed for the study, with 24-hour open access. In this questionnaire, we requested the opinions and degree of agreement of the panellists with different statements in relation to the assessment and improvement of healthcare quality in Nephrology. The estimated time for completing the questionnaire was 2-3 hours in each round.

Participants

The expert panel consisted of nephrologists, since they were considered to be the professionals who have the best knowledge of the healthcare situation in Nephrology Departments. Panellists were selected using the following criteria: representative of the different Nephrology subspecialties, having at least ten years' experience as a specialist, geographical diversity within Spain and a solid professional image for each expert in their main area of subspecialisation. The selection was carried out with the collaboration of the

Spanish Society of Nephrology (S.E.N.), which conducted a pre-selection of experts who met the abovementioned criteria. Each expert who agreed to participate did so individually and did not know the composition of the rest of the panel.

Sample size

We initially planned for a minimum of 20 experts to participate. The S.E.N. provided a list of 40 nephrologists. Once we verified that they met the requirements established, we contacted them via post and e-mail, with 37 agreeing to participate. Of these 37, 32 started the questionnaire (86.5%). The study was completed by 32 experts (100% of those starting the questionnaire).

Context of the questionnaire

The questionnaire had three parts. The first two parts were presented as a "management game". The experts were placed in a hypothetical situation. They became the new Heads of the Nephrology Department in a hospital of medium/high complexity with the objective of improving the quality of healthcare while maintaining the previous year's budget. Firstly, as Heads of the Nephrology Department, they were asked to analyse the quality of care delivered by the department. For this purpose they were given the outcome results of the previous few years. Next, they prepared a scorecard with the indicators they deemed to be most important. Secondly, they were asked by the Hospital Administration to improve the quality of care. Since the outcome results provided information on past performance, the Heads of the Nephrology Department had to prepare a new scorecard with information on the resources available (structural, human and organisational resources). In this manner, they could manage existing resources better and request or implement those of a low cost that did not exist and thereby attempt to improve the quality of healthcare without changing the budget, in accordance with the Hospital Administration's objectives.

The third part of the questionnaire was unrelated to the two previous parts. The experts were presented with another theoretical scenario: one of their relatives had been diagnosed with a nephrological disease and had asked the experts for their advice on the best Nephrology Department to treat their specific disease. This question was repeated for different kidney diseases.

Structure of the questionnaire

The questionnaire was divided into three sections: Section A focussed on healthcare quality outcome results, Section B on healthcare quality resources, and Section C on expert opinion regarding medical advice to select the best Nephrology

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Departments to treat specific kidney diseases.

In Section A (Healthcare quality results) we included criteria and indicators, or groups of indicators, divided under the following headings: Health results (mortality, complications, re-admissions and patient safety), Process management results (length of hospitalisation stay , outliers with regard to length of hospitalisation stay, delays in care and management of arteriovenous fistulas), Economic results (costs, productivity and work attendance rates), Perceived quality results (satisfaction survey and claims) and Scorecard of healthcare quality results (degree of updating, transparency, standards and weighting of criteria).

In Section B (Healthcare quality resources) we included criteria and indicators divided under the following headings: Structural resources (healthcare structuring, technology and techniques, use of medication, medical history, complementary healthcare activities, educational programmes, healthcare support and non-healthcare support within the hospital, and information technology (IT) and telemedicine), Human resources (doctors, nursing and assistant staff, dieticians and nutritionists), Organisational resources (department organisation standards, methods and assessment of healthcare quality for improvement) and Scorecard of resources for healthcare quality (need, degree of updating, transparency and weighting of criteria).

In Section C (Expert opinion on medical advice and the ability to select the best departments) different questions were asked about the ability of the expert to provide advice on the Nephrology departments where they thought the quality of care for specific diseases would be best, as well as the potential relationship between the image or prestige of a Nephrology department and the quality of its healthcare. Various questions were also included to determine the feasibility and relevance of a future survey to nephrologists about the image/prestige/quality of Nephrology departments.

Assessment scales

In the questionnaire, different assessment scales were used in accordance with the type of questions. Likert-type scales with five categories were used for most of the questions. We decided that for Section A the response categories would be "Essential, Important, Unnecessary, Leads to confusion and I don't know". No intermediate option between "Important" and "Unnecessary" was provided, since a questionnaire to decide on criteria/indicators that are necessary for knowing the quality of care provided by a department did not accept this intermediate option. For the analysis, these categories were grouped in order to perceive the results more clearly. There were specific scales for some questions because as the use of generic scales was inadequate for their content. In only a small number of questions more than one choice was

possible. In all of the multiple-choice questions, we included a section for comments from the panellists. Some questions were answered solely by comment.

Statistical methods

We agreed that, as a minimum, any criteria or proposal should obtain the support of 70% of the experts in order to be included in the new method to assess quality of care.

In each multiple-choice question in which only one response was allowed, we obtained the percentage of responses in each category. For those in which more than one answer was permitted, we obtained the percentage of panellists who selected each category.

At the end of Sections A and B, the panellists gave a score between 0 and 10 to each group of criteria, according to whether they thought that there was a lower or higher relationship between these criteria and the quality of healthcare. The results were summarised using means and medians.

RESULTS

The study was completed by all 32 nephrologists who started it. After concluding the two rounds of the Delphi questionnaire, each panellist individually accepted that their name would be amongst those of the experts who had participated in the study. The composition of the panel was not made public on this occasion either.

In the first round, the response rate was 99.9% for the questions of Section A, 99.7% for those of Section B and 99.6% for those of Section C. In the second round, 26 experts (81.3%) changed some of their answers while 6 did not change anything. The percentage of multiple-choice answers changed in the second round was 7%, since there were 453 changes in a total of 6496 questions (203 multiple-choice questions given to 32 experts). That is a mean of 14.2 changes for each of the 32 panellists (median 13.5).

The overall results of the study are presented in this paper.

Section A (Healthcare quality results)

To perceive the results more clearly, we grouped the five response categories in this section, "Essential, Important, Unnecessary, Leads to confusion and I don't know", as follows: the percentage of "Essential + Important", the percentage of "Unnecessary + Leads to confusion" and the percentage of the response "I don't know". The experts accepted 55 of the 62 criteria/indicators, considering them essential or important, with a mean acceptance percentage

of 91.3%. Seven criteria/indicators were not considered essential or important by 70% of the experts. The results in this part of the study are summarised in Table 1 and in more detail in Addendum 1.

With respect to the transparency of the results Scorecard, 100% of the experts believed that it was essential or important that all doctors in the department had access to this information. 90.6% believed that it should also be available for the rest of the hospital departments. In terms of access of citizens to healthcare quality results, 62.5% thought it was essential or important. There was an agreement of 71.9% when we proposed that the indicators for citizens would reflect the same reality, but in a more positive manner. For example, the percentage of patients treated without complications, compared with the percentage of patients treated with complications. 75% of the experts considered that it would be sufficient to update this Scorecard every three months.

Finally, in this part of the questionnaire, we asked the experts to score the different groups of criteria assessed in Section A, assigning each group a value (between 0 and 10) in accordance with a lesser or greater conceptual relationship with healthcare quality within their specialty (Table 2).

With respect to the comparison standards, both for health criteria/indicators and management and economic criteria/

indicators, the experts mainly chose (above 90%) national standards and, in a lower proportion, autonomous community and European standards.

Section B (Healthcare quality resources)

The five response categories in this section "A lot, Quite a lot, Little, Nothing and I don't know" are grouped in order to perceive as clearly as possible the degree of agreement. We obtained the percentages for "A lot + Quite a lot" and "Little + Nothing" and that of "I don't know".

The experts accepted 87 of the 92 resources proposed, since they contributed or potentially contributed a lot or quite a lot to improving the quality of healthcare in Nephrology, with a mean acceptance percentage of 93.6%. In 5 proposals, we did not obtain the minimum support of 70% of the experts. The results are summarised in Tables 3, 4 and 5, and in more detail in Addendum 2.

With respect to obtaining a healthcare quality resources Scorecard, 96.9% of the experts believed that it was necessary to complement the results Scorecard and, of these, 100% believed that it was essential or important that all doctors of the department had access to this information. 78.1% thought that it was also appropriate for

Table 1. Agreements on criteria/indicators for the assessment of healthcare quality

Criteria/indicators	N.º criteria/ indicators proposed	Response percentage	N.º criteria/ indicators accepted[a]	Agreement percentage (mean)
Health results				
Mortality	5	100	5	93.2
Complications	13	100	13	93.3
Re-admissions	2	100	1	93.8
Patient safety	6	100	4	93.0
Process management results				
Hospitalisation length of stay	4	100	4	93.0
Outliers (hospitalization length of stay)	4	100	1	75
Delay time	7	100	7	97.3
Arteriovenous fistula management	2	100	2	98.5
Economic results				
Costs	11	100	11	86.9
Productivity rates	2	100	2	79.7
Work attendance rates	2	100	1	71.9
Perceived quality results				
Satisfaction surveys and claims	4	99.2	4	91.4
Total	**62**	**99.9**	**55**	**91.3**

[a] Minimum agreement percentage between experts for the acceptance of each criterion/indicator: 70%.

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Table 2. Weighting of criteria/indicators for the assessment of healthcare quality

Group of criteria	Response percentage	Weighting[a] (mean)	Weighting[a] (median)
Health results			
Mortality	100	9.7	10
Complications	100	9.1	9
Re-admissions	100	7.4	8
Patient safety	100	9.3	10
Process management results			
Hospitalisation length of stay	100	7.6	8
Outliers (hospitalization length of stay)	100	5.8	6.5
Delay time	100	8.1	8
Arteriovenous fistula management	100	8.7	9
Economic results			
Costs	100	8.1	8
Productivity rates	100	7.6	8
Work attendance rates	100	7.3	8
Perceived quality results			
Satisfaction surveys and claims	100	8.1	8

[a] Maximum weighting of each group of criteria: 10. Minimum weighting of each group of criteria: 0.

the rest of the hospital departments to have access. 75% of the experts considered an annual updating of the resources Scorecard to be sufficient.

At the end of Section B, experts were also requested to score the different areas or groups of criteria assessed and had to assign each area a value (between 0 and 10) in accordance with the lesser or greater conceptual relationship of the resources proposed with the improvement in the quality of healthcare within their specialty (Table 6).

Section C (Expert opinion medical advice and the ability to select the best Nephrology departments)

81.3% of the nephrologists considered that, when a patient has a serious illness, the patient himself or a family member should ask for the advice of a specialist about the department where they can receive the best treatment for their illness. Of these nephrologists, 61.5% believed the reason was that the patient trusted the expert advice more than any other information system, while the rest believed the reason was that no system offered clear information (30.8%) or that information systems were not transparent (7.7%).

All the experts thought that, if they themselves or someone close to them required help, they would ask a colleague in the relevant specialty for expert opinion on the best hospital department for that problem. 59.4% indicated that they would also use the healthcare quality indicators and publications. None would search only for information, without also asking for advice.

We then asked them if they would be capable of offering advice or recommending a Nephrology information system for different diseases in their specialty (Table 7). We grouped the five response categories for this question "Yes, I think so, I am not sure, No and Any department" in order to facilitate the reading of results. We obtained the percentage of "Yes + I think so", that of "I am not sure + No" and the percentage of the response "Any department". We grouped options A and C in the last column, since we understand that both express the possibility of giving advice to the patient, which occurred in a mean of 87.5% cases. Only in Fabry disease and the haemolytic-uraemic syndrome was there a certain degree of difficulty in making a recommendation.

The experts believed that the reason for which an information system was more frequently recommended was mainly direct scientific visibility through conferences and publications (73.8%).

On the appropriateness of administering this type of surveys to nephrologists, 86.2% thought it was appropriate and even include them as additional criteria in the assessment of healthcare quality, since the Image/Prestige concept, according to 87.5% of the experts, was very or quite related to that of healthcare quality.

DISCUSSION

There was a high participation rate and a high degree of involvement in the responses by the experts, who on many

Table 3. Resources that could contribute to improving the quality of healthcare. Structural resources

Healthcare structural resources	Proposals carried out	Response percentage	Proposals accepted[a]	Agreement percentage (mean)
Healthcare structuring				
Specialised units	4	100	4	86.0
Specialised outpatient clinics	4	99.2	3	85.3
Outpatient service	1	100	1	71.9
Multidisciplinary functional units	4	96.9	3	82.3
Technology/techniques				
Diagnostic techniques	3	100	3	89.6
Therapeutic techniques	5	99.4	5	95
Use of medications				
Regulation of the medication use policy	3	100	3	86.5
Medical history				
Medical documentation	5	100	5	100
Complementary healthcare activities				
Complementary healthcare activities in the department	3	100	3	89.6
Educational programmes				
Specific educational programmes in the department	2	100	2	100
External healthcare support (in the hospital)				
Diagnostic support	3	100	2	98.5
Therapeutic support	8	100	8	95.7
External non-healthcare support (in the hospital)				
Welcome and support plans	3	100	3	88.6
Information technology and telemedicine				
Electronic medical history and implementation of telemedicine	2	100	2	95.4
Total	**50**	**99.6**	**47**	**91.7**

[a] Minimum agreement percentage between experts for the acceptance of each criterion/indicator: 70%.

occasions expanded on their answers with comments at the end of each question. Their participation and involvement are two of the most valuable aspects, taking into account that both are considered the main difficulties in any Delphi study. The questionnaire's length did not seem to have a negative influence, which, in our opinion, shows the experts' high level of commitment to the study.

The web platform also contributed to this study, since it made completing the questionnaire convenient, as it could be done from any location and at any time. The remote interaction between experts facilitated an anonymous, tension-free revision of the ideas as the result of individual reflection on the group's opinions. We believed it was important that the experts had the chance to address all the issues again in the second round and not only those selected due to a lack of agreement. The changes and clarifications of several questions in the second round confirmed this.

The broad agreement of the experts with most of the criteria and indicators proposed for the assessment and improvement of the quality of healthcare seems to be a consistent and solid basis for a future healthcare in Nephrology assessment and improvement model. It is necessary to highlight the favourable opinion towards the need for better organisation in the departments and the incorporation of internal assessment of healthcare quality with the support of some central departments such as Medical Documentation or Quality or of some Clinical Commissions. Furthermore, we must highlight the desire for better knowledge of the costs as guidance for more efficient processes.

Another important agreement was the validity of the specialist's expert opinion advice as guidance for the patient on the best departments for different diseases. Most experts related the image or prestige of a department with the quality of healthcare and declared their ability to identify the best departments for the treatment of specific diseases. It should

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Table 4. Resources that could contribute to improving the quality of healthcare. Human resources

Human resources	Proposals carried out	Response percentage	Proposals accepted[a]	Agreement percentage (mean)
Doctors				
Calculation of ratios and improvement of professional satisfaction	4	100	4	93.8
Nursing and assistant staff. Dieticians and nutritionists				
Calculation of ratios and improvement of professional satisfaction	5	100	5	93.8
Total	**9**	**100**	**9**	**93.8**

[a] Minimum agreement percentage between experts for the acceptance of each criterion/indicator: 70 %.

be noted that they considered scientific visibility as the main criterion for selecting the best departments and making a recommendation. The experts demonstrated their support for the future development of surveys for specialists on the image/prestige/healthcare quality of departments, which we considered to be important added value for finding the best departments for treating different diseases.

Finally, the great interest shown by nephrologists in participating in the construction of a methodology for assessing and improving the quality of healthcare, and most probably, its future implementation, suggests that seeking a consensus is a correct approach. The experts have shown their disposal and willingness to build Experience-based Quality together.

This methodology could have the following practical applications: internal assessment of healthcare quality in Nephrology departments, the development of guidelines for improving healthcare quality in each Nephrology department, comparative studies between Nephrology departments of different hospitals, surveys for nephrologists as a complementary method for assessing the quality of healthcare delivered by a department and information for citizens on Nephrology departments.

Table 5. Resources that could contribute to improving the quality of healthcare. Organisational resources.

Organisational resources	Proposals carried out	Response percentage	Proposals accepted[a]	Agreement percentage (mean)
Department organisation standards				
On staff	3	100	3	99
On healthcare operation	3	100	3	97.9
On access to training programmes	3	100	3	88.5
On research	1	100	1	96.9
On teaching	3	100	1	93.8
Methods				
Proposals relating to clinical practice guidelines	2	98.4	2	92.1
Proposals relating to clinical pathways	1	100	1	87.5
Medical protocols	9	100	9	97.9
Patient safety protocols	4	100	4	96.1
Other protocols	3	100	3	88.6
Assessment of healthcare quality for improvement				
Annual assessment of the department	1	100	1	100
Total	**33**	**99.9**	**31**	**95.2**

[a] Minimum agreement percentage between experts for the acceptance of each criterion/indicator: 70 %.

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Table 6. Weighting of resource groups for improving the quality of healthcare.

Group of criteria	Response percentage	Weighting[a] (mean)	Weighting[a] (median)
Healthcare structural resources			
Healthcare structuring	100	8.9	9
Technology/techniques	100	7.9	8
Use of medications	100	8.5	8.5
Medical history	100	9.1	9.5
Complementary healthcare activities	100	7.5	8
Educational programmes	100	7.6	8
External healthcare support (in the hospital)	100	7.2	8
External non-healthcare support (in the hospital)	100	7	7
Information technology and telemedicine	100	8.4	9
Human resources			
Doctors	100	9.4	10
Nursing and assistant staff. Dieticians-nutritionists	100	8,5	9
Organisational resources			
Department organisation standards	100	8.9	9
Methods	100	8.3	8
Assessment of healthcare quality for improvement	100	8.6	9

[a] Maximum weighting of each group of criteria: 10/Minimum weighting of each group of criteria: 0.

Study limitations

The results of the study may have limitations in terms of their applicability to other geographical settings and specialties, mainly with regard to the criteria/indicators selected and the structure of the expert panel. Further research is needed on the definition, validation and feasibility of indicators in Nephrology.

CONCLUSIONS

1. It is possible to obtain and develop, by consensus, a methodological proposal for the evaluation and improvement of healthcare quality in Nephrology, given the high participation of experts, their degree of involvement and the high number of agreements obtained on indicators of results and resources for healthcare quality.
2. Surveys for specialists to identify the best departments may be useful to provide expert opinion advice based on the pooled opinion of different specialists, thus decreasing the potential subjectivity of advice given by any individual specialist. In this regard, it is currently difficult for most patients to access valid expert opinion medical advice.
3. The conceptual association that the experts established between the image/prestige of a department and its healthcare quality makes us conclude that the

complementary inclusion of these surveys in healthcare quality assessment models could be useful.
4. The "construction" by specialists of a model that includes indicators of healthcare quality and expert opinion medical advice providing clear, fast and direct information about the best Nephrology departments leads us to the conclusion that the integration model proposed may provide citizens with guidance that may facilitate free choice.

Conflicts of interest

The authors declare that they have no conflicts of interest related to the contents of this article. The study was fully

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Table 7. Medical advice. Opinion on the specialist's ability to give guidance to patients who require treatment for certain nephrological diseases.

Would you be capable of providing advice on the best Nephrology Department for each of these diseases or processes?	Response percentage	Option A[a]	Option B[b]	Option C[c]	Sum of options A and C
Primary glomerular nephropathy	100	84.4		12.5	96.9
Glomerular nephropathy due to systemic autoimmune disease	100	81.3		12.5	93.8
Diabetic nephropathy	100	34.4		50.0	84.4
High blood pressure or its complications	100	40.6		50.0	90.6
Non-hypertensive vascular nephropathy	100	28.1		46.9	75.0
Advanced chronic kidney disease	100	40.6		50.0	90.6
Hereditary polycystic kidney disease	100	46.9		37.5	84.4
Fabry disease	100	56.3	37.5		62.5
Haemolytic uraemic syndrome	100	59.4	31.3		68.8
Acute renal failure	100	40.6		56.3	96.9
Chronic haemodialysis	100	56.3		40.6	96.9
Peritoneal dialysis	100	78.1		18.8	96.9
Deceased donor renal transplantation	100	84.4		3.1	87.5
Live donor renal transplantation	100	87.5		6.3	93.8
Complex or high-risk transplantation	100	93.8		0	93.8
Combined transplantation of kidney and other organ/tissue	100	87.6		0	87.5
Total	**100**	**62.5**	**12.5**	**25.0**	**87.5**

[a] Option A: Responses "Yes + I think so".
[b] Option B: Responses "I am not sure + No".
[c] Option C: Response "Any department".

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ADDENDUM 1. Healthcare quality results: proposals on Nephrology criteria/indicators.

Criteria/indicators	Percentage of experts who considered the criteria/indicator proposed to be essential or important	% responses Essential + Important
HEALTH RESULTS		
Mortality	Mortality rate	93.8
	Mortality rate adjusted for complexity	96.9
	Mortality rate by DRG	100
	Intra-ICU mortality rate (transferred Nephrology-ICU)	75
	HD patient mortality rate	100
Complications	Complication rate	87.5
	Complication rate adjusted for complexity	90.6
	Table of department complications	87.5
	Table of complications by main diagnosis/reason for admission	84.4
	Table of complications defined as sentinel by the department	90.6
	Kt/V of urea. Percentage of patients	96.9
	Mineral and bone metabolism (PTH, P, Ca). Percentage of patients	100
	Malnutrition (albumin). Percentage of patients	90.6
	Anaemia in HD patients. Percentage of patients	96.9
	Peritonitis in PD. Episodes per patient*month	100
	Bacteraemias dependent on the AVF and catheter. Episodes per patient*month	100
	Thrombosis of vascular access. Episodes per patient*month	90.6
	Loss of renal graft in a period of less than three months	96.9
Re-admissions	Urgent re-admission rate	93.8
	Scheduled re-admission rate	56.3
Patient safety	Nosocomial infection rate	100
	Transfusion reaction rate	62.5
	Pressure ulcer rate	71.9
	Hip fracture rate (after admission)	46.9
	Medication error rate	100
	HCV, HBV and HIV seroconversion rate in HD	100
PROCESS MANAGEMENT RESULTS		
Hospitalisation length of stay	Average LOS	84.4
	Average LOS adjusted for complexity	100
	Table with average LOS of department by DRG	100
	Table with average LOS of department by main diagnosis	87.5
Hospitalisation Outliers (LOS)	Higher outlier rate (LOS)	68.8
	Lower outlier rate (LOS)	75
	Zero LOS rate	40.6
	Difference between clinical discharge/hospital discharge (delayed discharge due to social reason)	68.8

Continues ADDENDUM 1. Healthcare quality results: proposals on Nephrology criteria/indicators

Delay time	Time from request to date of outpatient consultation	100
	Time from performance of kidney biopsy to availability result	100
	Time from request for imaging test to availability result	100
	Time from request for inpatient interconsultation to availability result	100
	Months on dialysis before transplantation	90.6
	Days from start of dialysis until inclusion on the transplant waiting list	100
	Percentage of dialysis patients who are on the transplant waiting list	90.6
AVF management	Percentage of catheters in HD patients	96.9
	Days between request of vascular access for HD and AVF surgery	100
COST/PRODUCTIVITY/WORK ATTENDANCE RESULTS		
Costs	Cost per DRG	90.6
	Pharmacy cost per DRG	93.8
	X-ray cost per DRG	84.4
	Laboratory cost per DRG	87.5
	Cost of other complementary tests per DRG	84.4
	Cost of haemodialysis	90.6
	Cost of peritoneal dialysis	90.6
	Cost of outpatient consultation	87.5
	First consultation x-ray cost	81.3
	First consultation laboratory cost	81.3
	Cost of other complementary tests in first consultation	84.4
Productivity	Doctor productivity rate	81.3
	Productivity rate of other professional healthcare categories	78.1
Work attendance	Doctor work attendance rate	71.9
	Work attendance rate of other professional healthcare categories (for each category)	68.8
PERCEIVED QUALITY RESULTS		
Patient satisfaction	Hospitalised patients who would recommend the department (%)	87.5
	Dialysis patients who would recommend the department (%)	87.5
	Patients seen in consultations who would recommend the department (%)	93.6
	Claims/activity (%)	96.9

PD: peritoneal dialysis, HD: haemodialysis, HIV: human immunodeficiency virus, HBV: hepatitis B virus, HCV: hepatitis C virus, AVF: arteriovenous fistula, PTH: parathyroid hormone, ICU: intensive care unit, LOS: lenght of stay.

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ADDENDUM 2. Resources that may contribute to improving the quality of healthcare

Resources	Percentage of experts that considered that the resources proposed could contribute (a lot or quite a lot) to improving the quality of healthcare	% responses A lot + Quite a lot
HEALTHCARE STRUCTURAL RESOURCES		
	Healthcare structuring	
Specialised units	Haemodialysis Unit	93.8
	Peritoneal Dialysis Unit	93.8
	Hypertension and Ambulatory High Blood Pressure Monitoring Unit	75
	Intermediate Care Unit (unstable patients/patients immediately after transplantation)	81.3
Specialised outpatient clinics	Nephropathy and Diabetes Clinic	71.9
	Advanced Chronic Kidney Disease Clinic	90.3
	Glomerular Nephropathy and Autoimmune Disease Clinic	93.8
	Hereditary Kidney Disease Clinic	21.9
Outpatient service	Outpatient service within the Nephrology Department for the administration of i.v. Fe, immunosuppressants, antibiotics, [red blood cells]	71.9
Multidisciplinary functional units	Renal Transplantation Multidisciplinary Functional Unit	84.4
	Autoimmune Disease Multidisciplinary Functional Unit	78.1
	Nephropathy and Diabetes Multidisciplinary Functional Unit	84.4
	Cardiovascular Risk Multidisciplinary Functional Unit	62.5
	Technology/techniques	
Diagnostic techniques	Perform renal biopsy technique	78.1
	Availability of ABPM	93.8
	Perform ultrasound	96.9
Therapeutic techniques	Availability of conventional HD	93.8
	Availability of on-line haemodiafiltration	96.9
	Perform renal transplantation	96.8
	Perform plasmapheresis	90.6
	Perform live donor renal transplantation	96.9
	Use of medication	
Prescription and regulation of medications	The prescription of medication must always be based on adequate evidence of efficacy, although in exceptional cases, it is necessary to do so without definitive evidence	100
	The prescription must always take into account the difference in cost between medications of the same therapeutic action and side effects, especially for medium and high cost medication	100
	The medication use policy in the hospital must be implemented, but its regulation must be based on a consensus between doctors of the department	96.9
	Medical history	
Medical documentation	Discharge report specifying the diagnostic impression, treatment and recommendations of discharge for the patient and for the Primary Care doctor	100
	Informed consent for the description of the technique, general and specific risks, and alternatives to treatment in terms that the patient understands	100
	Consultation report that sufficiently details the diagnostic impression, treatment and discharge recommendations	100
	Daily progress notes	100
	Clearly completed medical orders	100

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Continues ADDENDUM 2. Resources that may contribute to improving the quality of healthcare

Complementary Healthcare Activities		
Complementary healthcare activities in the Nephrology Department	Chronic wounds review programmes in HD patients	75
	Specific programmes reviewing interactions and conciliation of medication for patient advice	100
	Nutritional advice programmes, carried out by dieticians/nutritionists of the department	93.8
Educational programmes		
Educational programmes in the Nephrology Department	Educational programmes on kidney disease for patients and caregivers	100
	Patient and caregiver educational programmes on home dialysis	100
External healthcare support (in the hospital)		
Diagnostic support	Nephropathologist	100
	Renal Doppler ultrasound	96.9
	Genetics laboratory, capable of advising about potential problems caused by genetic defects	59.4
Technical support	Normalised coordination: Nephology and Primary Care	100
	Normalised coordination: Nephology and Internal Medicine	84.4
	Normalised coordination: Nephology and Emergency	100
	Normalised coordination: Nephology and ICU	100
	Normalised coordination: Nephology and Vascular Surgery	100
	Normalised coordination: Nephology and Interventional Radiology	100
	Normalised coordination: Nephology and Dieticians	87.5
	Normalised coordination: Nephology and Palliative Care Unit	93.8
External non-healthcare support (in the hospital)		
Welcome and support plans	Personalised welcome plan (verbal and written, hospital and department)	96.9
	Possibility of obtaining emotional support	87.5
	Presence of translators for patients with difficulty in speaking the language	81.3
Information technology and telemedicine		
Computerisation	Electronic medical history (all documents, images and other tests)	96.9
	Telemedicine for the visualisation of images and follow-up of diagnostic and therapeutic processes in other centres	93.8
HUMAN RESOURCES		
Doctors		
Medical staff ratio	Definition of a calculation method agreed with the Hospital Administration in order to obtain the appropriate nephrologist ratio	90.6
Professional satisfaction	Existence of a relationship between professional satisfaction of the doctor and quality of healthcare	100
	Existence of a relationship between work motivation systems and professional satisfaction of the doctor	96.9
	Existence of a relationship between the possibility for the individual to choose their own motivation systems and improvement of the doctor's level of satisfaction	87.5
Nursing and Assistant Staff. Dieticians. Nutritionists		
Non-medical healthcare staff ratio	Definition of a calculation method agreed with the Hospital Administration to obtain the appropriate ratio of non-medical healthcare staff	87.5
Experience and specific knowledge	The Head of Department must determine the minimum experience and specific knowledge that the non-medical healthcare staff must possess	93.8
Professional satisfaction	Existence of a relationship between professional satisfaction of non-medical healthcare staff and quality of healthcare	100
	Existence of a relationship between work motivation systems and professional satisfaction of non-medical healthcare staff	100
	Existence of a relationship between the possibility for the individual to choose their own motivation systems and improvement of the non-medical healthcare staff's level of satisfaction	87.5

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Continues ADDENDUM 2. Resources that may contribute to improving the quality of healthcare

ORGANISATIONAL RESOURCES

	Department organisation standards	
Staff	Definition of the organisational structure	100
	Definition of the functional content of healthcare job posts	96.9
	Agreement between the Head of Department and the Hospital Administration for the definition of the medical healthcare staff selection procedure (vacancy requirements and how to fill them)	100
Healthcare operation	Definition of healthcare procedures developed by the department (performance of and time assigned to consultations, hospital rounds, method for assigning doctor in charge, etc.)	96.9
	Definition of standards for performing clinical sessions, timetable, content structuring, case presentation method, methods for achieving a consensus of therapeutic attitudes, etc.	100
	Definition of a management procedure of cases that require immediate or urgent treatment	96.9
Access to training programmes	Definition, in the department, of regulations for doctor access to the different training programmes	100
	Training in patient rights (confidentiality, privacy, medical information, responsible doctor, access to second opinion)	78.1
	Promoting the courses necessary for learning abilities for managing difficult situations, communicating bad news, etc.	875
Research	Promoting standardised research in the department	96.9
Teaching	Training of RP in the department	93.8
	Standardised training of fellows in the department	65.6
	Undergraduate training in the department	68.8
	Methods	
Clinical practice guidelines	Monitoring clinical practice guidelines of the Spanish Society of Nephrology	93.8
	Monitoring international clinical practice guidelines	90.3
Clinical pathways	Development, implementation and monitoring of clinical pathways	87.5
Medical protocols	Existence and monitoring of a protocol of immunosuppressants in transplantation	100
	Existence and monitoring of a glomerular nephropathy treatment protocol	96.9
	Application of a protocol for treating systemic autoimmune diseases	96.9
	Application of a protocol for treating bacteraemias in HD	100
	Application of a protocol for treating peritonitis in PD	100
	Existence and monitoring of an antibiotic prophylaxis protocol	96.9
	Existence and monitoring of a thromboembolism prophylaxis protocol	96.9
	Existence and monitoring of a protocol for prevention and treatment of mineral and bone metabolism disorders in kidney disease	96.9
	Existence and monitoring of a protocol for treating anaemia in kidney disease	
Patient safety protocols	Patient identification	87.5
	Safe administration of medications	96.9
	Management of high-risk medication	100
	Washing hands and preventing nosocomial disease	100
Other protocols	Prevention of re-admissions in the department	71.9
	Continuity of healthcare at home	96.9
	Prevention of complications in the department	96.9
	Assessment of healthcare quality for improvement	
Assessment of resources	Annual assessment of the availability of resources required for improving the quality of healthcare in the department	100

PD: peritoneal dialysis, HD: haemodialysis, i.v.: intravenous, ABPM: ambulatory blood pressure monitoring, RP: resident physician, ICU: intensive care unit.

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ADDENDUM 3. Expert panel of the Nephrology Delphi Study (in alphabetical order).

Surnames	Name	Hospital
Ballarín Castán	José Aurelio	Fundació Puigvert (Barcelona)
Baró Salvador	María Eva	Hospital Universitario de Torrevieja
Conde Olasagasti	José Luis	Complejo Hospitalario Universitario de Toledo
de Arriba de la Fuente	Gabriel	Hospital Universitario de Guadalajara
Fernández Giraldez	Elvira	Hospital Universitario Arnau Vilanova (Lleida)
Frutos Sanz	Miguel Ángel	Hospital Universitario Carlos Haya (Malaga)
Gómez Roldán	Carmen Asunción	Complejo Hospitalario Universitario de Albacete
Górriz Teruel	José Luis	Hospital Universitario Dr. Peset Aleixandre (Valencia)
Herrero Calvo	José Antonio	Hospital Universitario Clínico San Carlos (Madrid)
Martín de Francisco Hernández	Ángel Luis	Hospital Universitario Marqués de Valdecilla (Santander)
Martín Malo	Alejandro	Hospital Universitario Reina Sofía (Cordoba)
Martínez Castelao	Alberto	Hospital Universitario Bellvitge (Barcelona)
Milán Martín	José Antonio	Hospital Universitario Virgen Macarena (Seville)
Molina Miguel	Antonio	Hospital Universitario Río Hortega (Valladolid)
Molina Núñez	Manuel	Hospital Universitario Santa Lucía (Cartagena)
Ortega Suárez	Francisco	Hospital Universitario Central de Asturias (Oviedo)
Osuna Ortega	Antonio	Hospital Universitario Virgen de Las Nieves (Granada)
Otero González	Alfonso	Complejo Hospitalario Universitario de Ourense
Pallardó Mateu	Luis Manuel	Hospital Universitario Dr. Peset Aleixandre (Valencia)
Pérez García	Rafael	Hospital Universitario Infanta Leonor (Madrid)
Poch López de Briñas	Esteban	Hospital Universitario Clínic (Barcelona)
Portolés Pérez	José María	Hospital Universitario Puerta de Hierro (Majadahonda)
Purroy Unanua	Andrés	Clínica Universitaria de Navarra (Pamplona)
Quereda Rodríguez	Carlos	Hospital Universitario Ramón y Cajal (Madrid)
Remón Rodríguez	César	Hospital Universitario Puerto Real (Cadiz)
Rivera Hernández	Francisco	Hospital General Universitario de Ciudad Real
Rodríguez Puyol	Diego	Hospital Universitario Príncipe de Asturias (Alcalá de Henares)
Sanjuan Hernández-Franch	Alberto	Hospital Universitario Miguel Servet (Zaragoza)
Serón Simancas	Daniel	Hospital Universitario Vall d´Hebrón (Barcelona)
Tabernero Romo	José Matías	Hospital Universitario de Salamanca
Valdés Cañedo	Francisco Antonio	Complejo Hospitalario Universitario de A Coruña
Vidaur Otegui	Fernando	Hospital Universitario Donostia

All participants individually accepted the proposal to be listed in the final report, without knowing the composition of the panel or results of the study.