



# BMJ Open Proposal of a clinical care pathway for quality and safe management of headache patients: a consensus study report

Julio Pascual,<sup>1,2</sup> Patricia Pozo-Rosich ,<sup>3,4</sup> Irene Carrillo ,<sup>5,6</sup> Sandra Rodríguez-Justo,<sup>7</sup> Dolores Jiménez-Hernández ,<sup>8,9</sup> Almudena Layos-Romero ,<sup>10</sup> Cristina Bailón-Santamaría,<sup>1</sup> Antonio Torres,<sup>11</sup> Alba Martínez-García,<sup>6</sup> Emilio Ignacio,<sup>12</sup> José Joaquín Mira ,<sup>6,13</sup>

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For numbered affiliations see end of article.

## Correspondence to

Irene Carrillo; [icarrillo@umh.es](mailto:icarrillo@umh.es)

## ABSTRACT

**Background** Headache is one of the most prevalent and disabling conditions. Its optimal management requires a coordinated and comprehensive response by health systems, but there is still a wide variability that compromises the quality and safety of the care process.

**Purpose** To establish the basis for designing a care pathway for headache patients through identifying key subpathways in the care process and setting out quality and clinical safety standards that contribute to providing comprehensive, adequate and safe healthcare.

**Method** A qualitative research study based on the consensus conference technique. Eleven professionals from the Spanish National Health System participated, seven of them with clinical experience in headache and four specialists in healthcare management and quality. First, identification of the key subpathways in the care process for headache, barriers/limitations for optimal quality of care, and quality and safety standards applied in each subpathway. Second, two consecutive consensus rounds were carried out to assess the content of the subpathway level descriptors, until the expert agreement was reached. Third, findings were assessed by 17 external healthcare professionals to determine their understanding, adequacy and usefulness.

**Results** Seven key subpathways were identified: (1) primary care, (2) emergency department, (3) neurology department, (4) specialised headache unit, (5) hospitalisation, (6) outpatients and (7) governance and management. Sixty-seventh barriers were identified, the most frequent being related to diagnostic errors (36,1%), resource deficiency (25%), treatment errors (19,4%), lack of health literacy (13,9%) and inadequate communications with care transitions (5,6%). Fifty-nine quality and 31 safety standards were defined. They were related to evaluation (23.3%), patient safety (21.1%), comprehensive care (12.2%), treatment (12.2%), clinical practice guidelines (7.8%), counselling (6.7%), training (4.4%) and patient satisfaction (3.3%).

**Conclusions** This proposal incorporates a set of indicators and standards, which can be used to define a pathway for headache patients and determine the levels of quality.

## Strengths and limitations of this study

- The consensus conference is an appropriate methodology to gather expert knowledge on a specific topic. In this study, 28 experts from different health services in Spain participated in the design of the headache care pathway.
- To our knowledge, this is one of the first studies to provide a detailed description of the headache care pathway with the integration of the different levels of care under a national health system model.
- The headache care pathway has been designed within the framework of the Spanish national health system, limiting its generalisation to other health contexts with different organisational models.
- It was not possible to incorporate the speciality of pharmacy in the development of the study.

## INTRODUCTION

Headache, besides being one of the most prevalent pathologies, generates a high demand for care that makes it one of the most common reasons for consultation in primary care (PC) and neurology.<sup>1 2</sup> This condition constitutes one of the most disabling health problems and supposes, for those who suffer from it, a significant socioeconomic impact, secondary to both the direct and indirect costs of the illness, given that, in many cases, it involves absence from work during the most productive years of a person's life.<sup>2 3</sup>

This impact of this neurological pathology necessitates an effective and coordinated response by healthcare mechanisms.<sup>4 5</sup> Thus, diagnostic criteria and treatment guidelines have been established,<sup>6</sup> response protocols at different levels of care,<sup>7 8</sup> care pathways<sup>9 10</sup> and the quality of headache treatment has been evaluated.<sup>11</sup> Despite this, there is high

variability between countries and health systems in the organisation and design of the care process.

Headache is a pathology that is usually underestimated, which has had a negative impact on the quality of care patients are given, which is sometimes suboptimal.<sup>1</sup> This poor result is due, in part, to the problems of organisation and coordination between the different levels of care involved in the diagnosis and treatment of these patients.<sup>10</sup>

The quality of care is also affected by the introduction of new classifications and the existence of a multitude of conditioning situations, such as a large number of headache types, the abuse of self-medication, the complexity of the symptoms or the comorbidities associated with this medical condition.<sup>2</sup>

In PC, where most of the patients with headache initially attend, barriers to patient quality and safety have been detected, including underdiagnosis, the omission of referrals when called for by the patient's diagnostic and therapeutic complexity, diagnostic and therapeutic errors and delays in the start of preventive treatments.<sup>1,10</sup> There has been an attempt to improve the quality of care of these patients in the emergency department through referral protocols.<sup>10</sup> On the other hand, errors are also detected in the assessment and diagnosis of headache patients in hospitals that hinder the success of therapeutic interventions.<sup>12</sup>

In this context, the research question that guided this study was how headache patient care can be systematically organised to reduce unnecessary variability and ensure the quality and safety of the care process. Accordingly, the purpose of the study was to establish the basis for designing a care pathway for headache patients through identifying key subpathway in the care process and setting out quality and clinical safety standards that contribute to providing comprehensive, adequate and safe healthcare.

## METHODS

A qualitative research study based on the consensus conference technique among professional experts. This technique consisted in conducting a scientific conference with experts to develop recommendations to address problems related to clinical practice. Among the main advantages of this technique is its adequate performance with heterogeneous groups, which allows very diverse perspectives in multidisciplinary work to be obtained, and its ability to promote consensus among participating experts.<sup>13,14</sup> The study period was between February and September 2019. [Figure 1](#) describes the phases of the study.

First, a study management team was formed made up of representatives of all the specialties involved in the headache patient care process. The management team was responsible for selecting the benchmark clinical practice guidelines, the relevant sources of information, and for defining and validating quality and safety standards, as

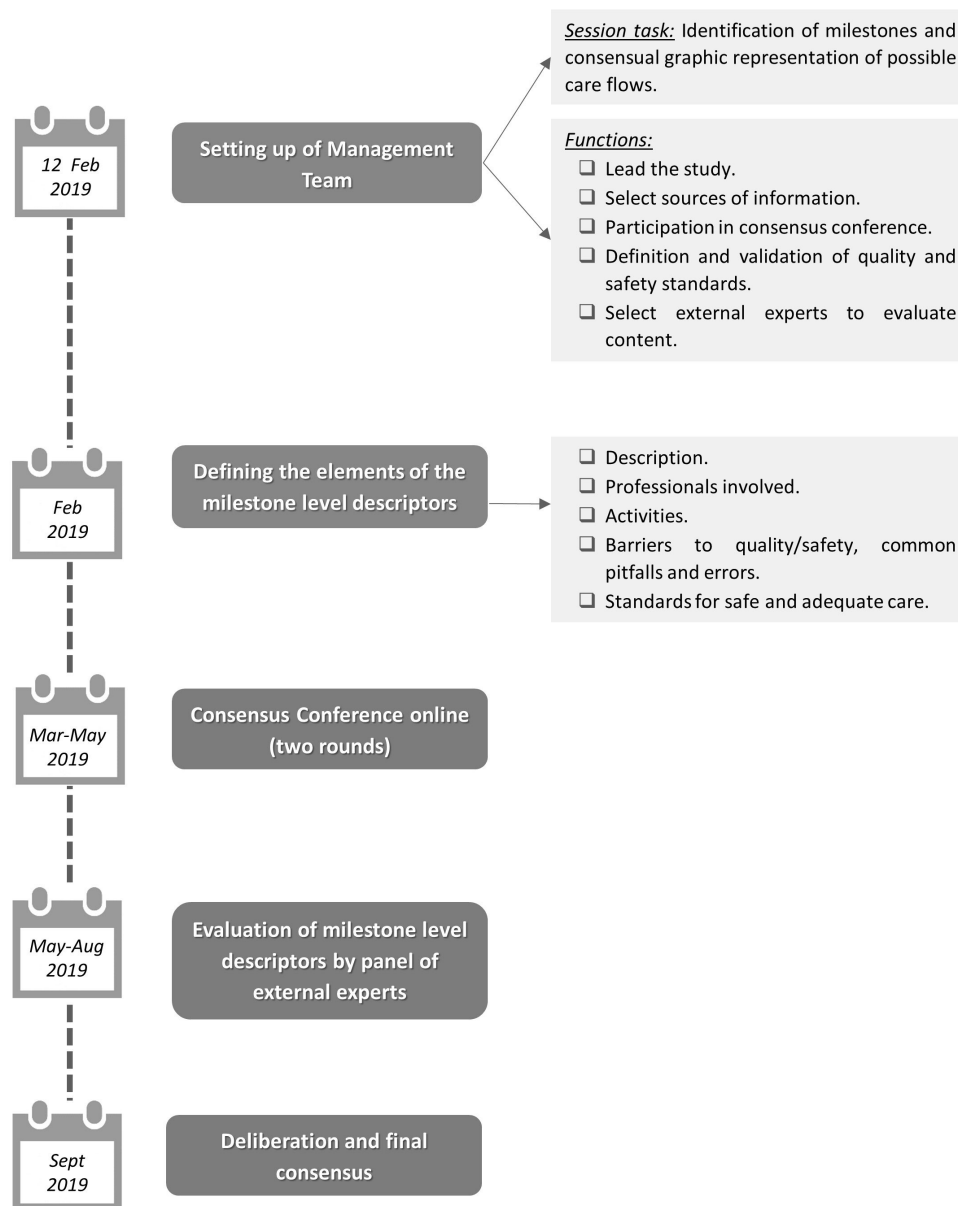
well as selecting external experts for the final evaluation of the content.

A total of 11 professionals participated in the consensus conference, seven of them with clinical experience in headache patient care (four neurologists, an emergency/PC physician, a health manager and a nurse), and four specialists in healthcare management and quality, including the management of qualitative techniques. This first phase of the study was based on the identification and consensus of the key subpathways in the care process for headache patients and on the graphical representation of possible care flows.

In the first phase, different issues were addressed in a face-to-face session led by a moderator, in which the individual contributions of the participants and other inputs derived from an open debate were compiled. The issues raised in this meeting focused on the subpathways and elements of the care pathway related to quality and clinical safety in the care of headache patients. As a result of this session, the first draft of level descriptors was prepared for each of the subpathways previously identified from the consultation of specialised sources and group work. The structure of the subpathway level descriptors was composed of the following categories of information: (1) description of the subprocess, (2) professionals involved, who intervenes? (3) activities of the subprocess (what activities or interventions are contemplated?), (4) barriers to quality and safety, common pitfalls and errors, (5) standards for adequate and safe care (with the specification of criteria, standards, and sources of information) ([table 1](#)). In this session, as well as identifying the subpathways, a first draft of the graphic representation of the possible attention flows was agreed on.

The second phase of the study was carried out through online systems to facilitate debate and consensus-building among experts. In this phase, two consecutive consensus rounds were carried out to assess the content of the subpathway level descriptors and the flow chart, until the agreement was reached between the experts on the management team. Once the consensus rounds were over, the team members made a selection of professionals from their specialty to be invited to participate in the study, contributing their assessment, opinion and experience as members of a panel of experts. This panel was made up of 22 professionals (nine neurologists, three PC physicians, five physicians specialised in family medicine, but assigned to emergency departments, and five health managers from different regions and health services in Spain).

The panel of experts took part in the final phase of external evaluation for the improvement of the subpathway level descriptors prepared, assessing the degree of suitability of the subpathways and their elements, to what extent the barriers identified prevented safe and quality care from being carried out to the headache patient, as well as the degree of suitability of the standards for adequate and safe care. Furthermore, they assessed the contents of these subpathway



**Figure 1** Main phases of the study.

level descriptors in terms of understanding, adequacy and practical usefulness of the information, using a numerical scale from 0 to 10 points. Each panel expert exclusively valued those subpathways related to their

professional specialty. Once the evaluation phase was finalised and the contributions made by this panel were incorporated, the final version of the descriptive cards and the flow chart was completed.

**Table 1** Definition of descriptive categories of information for each subpathway

| Category of information                                    | Definition   |
|--|--|
| Subpathway   | The thread that brings together relevant elements and specific purpose integrated into the care pathway of the headache patient. |
| Description  | Features of the corresponding subpathway.  |
| Who intervenes   | Professionals responsible for the subpathway described.  |
| What activities or interventions are contemplated          | Statement of the relevant functions and actions in the course of the subpathway for the care of the headache patient.            |
| Barriers to quality and safety, common pitfalls and errors | Difficulties and potential quality or safety problems that may hinder the proper fulfilment of a subpathway.                     |

**Table 2** Professionals and key activities in the different subpathways of the headache patient care process

| # | Subpathway                | Person(s) involved                           | Activities   |
|---|---------------------------|--|--|
| 1 | PC                        | PC, GP and nursing staff (follow-up)         | Diagnosis (differential and request for tests), therapeutic approach, health education, monitoring and possible referral to ND or ED.  |
| 2 | ED                        | EP   | Triage, initial assessment (history and examination), possible complementary tests, and referral to PC, ND or SHU. Patients admitted to the emergency observation unit under duty doctor when there is no neurologist on call.   |
| 3 | ND                        | Neurologist                                  | Headache diagnosis (history, physical and neurological examination), differential diagnosis (request for complementary tests), prescription of hygienic-dietary measures, pharmacological treatment, delivery of headache diary, health education, identification of headache-related disability (MIDAS and HIT-6 scales), coordination with PC and ED and referral to SHU for advanced therapies. |
| 4 | SHU                       | Neurologist                                  | Request for additional tests (laboratory and imaging), diagnosis (history and examination), treatment, follow-up, possible indication of hospital admission, referral to DH, ND or others and discharge to PC.   |
| 5 | Hospitalisation           | Neurologist and nursing staff                | Differential diagnosis, specific diagnostic tests, therapeutic approach, treatment of the underlying process (secondary headaches) and referral to ND or PC for follow-up.   |
| 6 | Outpatients               | Neurologist and nursing staff                | Diagnostic and therapeutic approach (lumbar puncture, parenteral treatment).   |
| 7 | Governance and management | Administrators, senior and middle management | Guarantee the availability of the necessary means for adequate care, the appropriate professional competencies of the personnel involved, and the ongoing evaluation of the structure, processes and outcomes to ensure comprehensive, coordinated and accessible healthcare for the headache patient.   |

DH, day hospital; ED, emergency department; EP, emergency physician; GP, general practitioner; HIT-6, six-item headache impact text; MIDAS, migraine disability assessment scale; ND, neurology department; PC, primary care; SHU, specialised headache unit.

### Patient and public involvement

Patients or the public were not involved in any phase of this study.

## RESULTS

### Key subpathways in the care pathway for headache patients

Seven key subpathways were identified in the process of comprehensive headache patient care: (1) PC, (2) emergency department, (3) neurology department, (4) specialised headache unit, (5) hospitalisation, (6) outpatients and (7) governance and management (table 2). The integration of these seven subpathways in the care pathway is represented in the flow chart shown in figure 2. This diagram does not represent the path that all headache patients necessarily follow, but tries to capture all the possibilities and casuistry of care. Therefore, the full descriptive cards for each subpathway are available in the online supplemental material. Subpathway 3, which is referred to as the department of neurology (general consultation), was subdivided into two descriptive cards, one corresponding to the diagnostic process (3A) and the other to the treatment process (3B), for greater clarity of information.

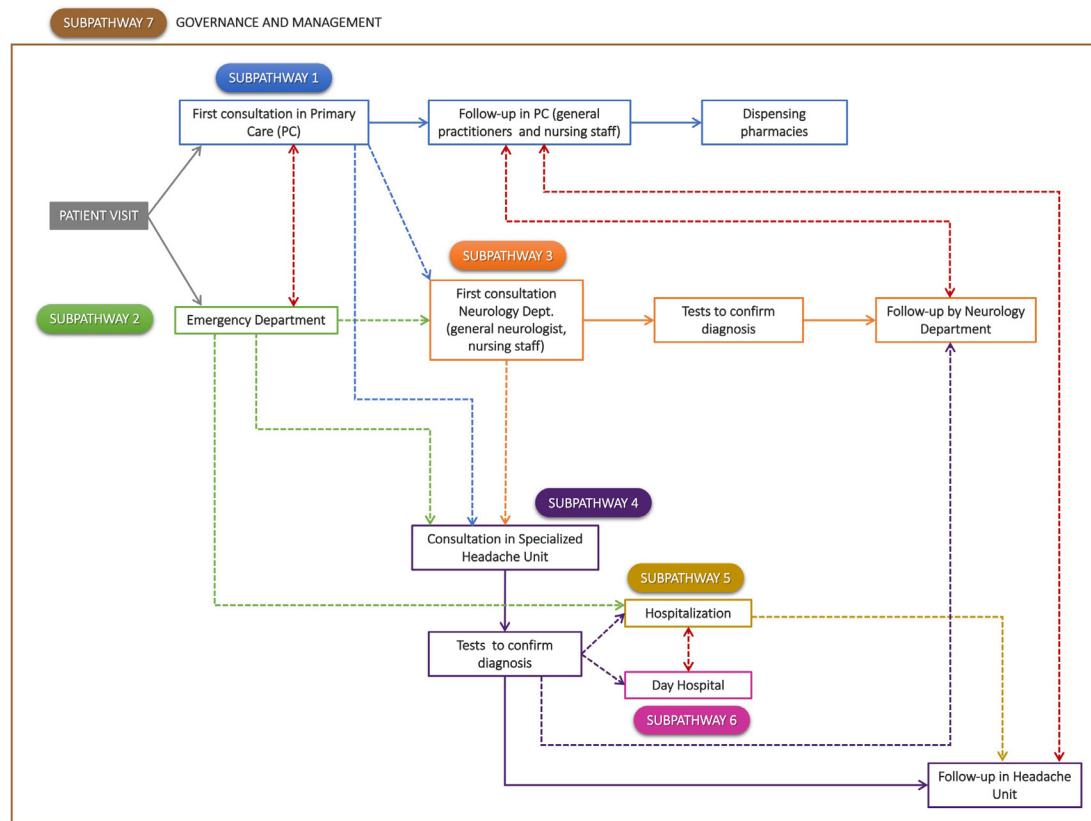
### Barriers to quality and clinical safety

For the first six subpathways identified in the headache patient care process, a total of 67 barriers/limitations were identified that, according to experts, prevented or hindered the provision of safe and quality care (table 3). The subpathway in which the greatest number of barriers were concentrated was number 3, corresponding to the general consultation of the department of neurology (20.9% related to diagnosis—3A and 19.4% to treatment—3B).

The barriers present in a greater number of subpathways of the headache patient care process were classified into five categories: diagnostic errors (36.1%), resource deficiency (25%), treatment errors (19.4%), lack of health literacy (13.9%), and inadequate communications with care transitions (5.6%) (table 4).

### Criteria and standards for adequate and safe care

A total of 59 quality and 31 safety criteria and standards were defined. The standards were related to evaluation (21, 23.3%), patient safety (19, 21.1%), comprehensive care (11, 12.2%), treatment (11, 12.2%), compliance with clinical practice guidelines (7, 7.8%), counselling (6, 6.7%), training (4, 4.4%), patient satisfaction (3, 3.3%) and others (8, 8.9%).



**Figure 2** Descriptive flow chart of the care pathway for the headache patient  
**figure 2**Note: Dotted arrows indicate referral paths to other levels of care. The red bidirectional arrows indicate that the referral path can be used in both directions.

**Evaluation of content by the panel of external experts**

Seventeen professionals not belonging to the project team participated in the external evaluation process of the subpathway level descriptors and contents developed

by the team itself (response rate of 77.3%). Table 5 shows the results of this evaluation.

Generally speaking, experts positively evaluated the contents of the subpathway level descriptors drawn up with

**Table 3** Barriers to quality and safety and common pitfalls and errors in six of the seven subpathways of the headache patient care process

|   | No of barriers identified in each subpathway |
|---|--|
| Subpathway 1. Primary care. Identification, therapeutic approach and possible referral  | 11   |
| Subpathway 2. Emergency department. Triage, assessment, treatment and referral to primary care or neurology department (general or specialised headache unit) or admission in hospital                                      | 9  |
| Subpathway 3. Neurology Department (general consultations).   | 14   |
| A. Diagnostic and therapeutic approach of the headache patient in general neurology consultations   |  |
| B. Identification, therapeutic approach and possible referral in the neurology department, general neurologist to headache neurologist  | 13   |
| Subpathway 4. Consultation in specialised headache unit. Request for complimentary tests, diagnosis, treatment, follow-up and possible hospital admission or referral to day hospital, neurology department or primary care | 8  |
| Subpathway 5. Hospitalisation. Identification, therapeutic approach during hospitalisation  | 8  |
| Subpathway 6. Therapeutic approach in day hospital/outpatients  | 4  |

A and B represent closely related elements of subpathway 3 (general consultation in the neurology department). The separation of these elements has been done with the only purpose of differentiating the barriers that hinder the correct diagnosis of headache (A) from those that affect the adequate therapeutic approach (B).

**Table 4** Most relevant barriers to achieving optimal care quality

|  | N  | Subpathways in which it is present |
|--|----|------------------------------------|
| Diagnostic errors  | 13 |                                    |
| Barrier 1. Excessive complementary tests                           | 5  | 2, 3A, 3B, 4, 5                    |
| Barrier 2. Diagnostic errors                                       | 4  | 1, 3A, 3B, 4                       |
| Barrier 3. Underdiagnosis and omission of timely referral          | 4  | 1, 3A, 3B, 4                       |
| Resource deficiency  | 9  |                                    |
| Barrier 6. Excessive delay in care                                 | 3  | 3A, 3B, 4                          |
| Barrier 7. Lack of physical resources                              | 2  | 3A, 3B                             |
| Barrier 8. Short time per visit                                    | 2  | 3A, 3B                             |
| Barrier 9. Unavailability of day hospitals                         | 2  | 4 to 6                             |
| Treatment errors   | 7  |                                    |
| Barrier 4. Medication errors (abuse or inappropriate prescription) | 5  | 1, 2, 3B, 4, 5                     |
| Barrier 5. Non-use or improper use of reference guidelines         | 2  | 3A, 3B                             |
| Lack of health literacy  | 5  |                                    |
| Barrier 10. Poor health education of patients                      | 3  | 1, 3A, 5                           |
| Barrier 11. Non-delivery of documentation on patient treatment     | 2  | 3A, 3B                             |
| Inadequate communication with care transitions                     | 2  |                                    |
| Barrier 12. Inadequate referral                                    | 2  | 1 to 2                             |

N, number of times experts pointed out this barrier as limiting the quality of care.

an average value of at least eight points in each of the evaluation categories (understanding, adequacy and usefulness). The best-rated subpathways were in this order: management, consultation in specialised headache units and emergencies. Likewise, those considered most useful for their practical application were those related to management, emergency and PC. According to neurologists, the main focus was to improve the practical usefulness of the content related to the treatment process in general neurology (subpathway 3.2) whose score did not reach 7 points.

## DISCUSSION

Analysing the pathway followed by the headache patient in the course of the healthcare they receive, considering all the options and the differences in the complexity of their clinical situation, makes it possible to address the evaluation and improvement of healthcare quality and patient safety. This study is framed within this line of work initiated by the Global Campaign against Headache<sup>5</sup> conducted by lifting the burden (LTB) in direct contact with WHO.

**Table 5** External evaluation of the level descriptors for each subpathway identified in the headache patient care process

| Subpathway                        | N  | Understanding the information |     | Adequacy of the information |     | Usefulness |     |
|-----------------------------------|----|-------------------------------|-----|-----------------------------|-----|------------|-----|
|                                   |    | Mean (SD)                     | CV  | Mean (SD)                   | CV  | Mean (SD)  | CV  |
| 1.Primary care                    | 3  | 8.0 (0.8)                     | 0.1 | 8.0 (0.0)                   | 0.0 | 8.7 (0.0)  | 0.0 |
| 2.Emergency department            | 5  | 8.6 (1.4)                     | 0.2 | 9.2 (0.7)                   | 0.1 | 8.8 (1.2)  | 0.1 |
| 3A. General neurology (diagnosis) | 4  | 8.5 (1.5)                     | 0.2 | 8.5 (1.1)                   | 0.1 | 8.3 (2.0)  | 0.2 |
| 3B. General neurology (treatment) | 4  | 7.0 (1.7)                     | 0.2 | 7.8 (1.5)                   | 0.2 | 6.5 (2.1)  | 0.3 |
| 4.Specialised headache unit       | 3  | 9.0 (0.8)                     | 0.1 | 9.0 (0.8)                   | 0.1 | 8.0 (1.6)  | 0.2 |
| 5.Hospitalisation                 | 4  | 8.0 (1.6)                     | 0.2 | 7.5 (2.1)                   | 0.3 | 7.0 (1.9)  | 0.3 |
| 6.Day hospital/outpatients        | 4  | 8.8 (0.8)                     | 0.1 | 8.5 (1.1)                   | 0.1 | 7.5 (1.8)  | 0.2 |
| 7.Management                      | 5  | 9.0 (0.0)                     | 0.0 | 9.0 (0.0)                   | 0.0 | 8.8 (0.4)  | 0.0 |
| Total                             | 17 | 8.4 (1.4)                     | 0.2 | 8.5 (1.3)                   | 0.2 | 8.0 (1.8)  | 0.2 |

CV, coefficient of variation.

In the framework of this worldwide project, LTB in collaboration with the European Headache Federation promoted the creation of a service quality evaluation (SQE) group of health services researchers and headache specialists. This team of professionals developed a set of 30 indicators organised in nine domains to assess the quality of headache services<sup>15</sup> that has been validated in 12 European countries<sup>16–18</sup>. Recently, Steiner *et al*<sup>19</sup> have continued this initiative by defining the 10 roles that headache centres play within broader and more structured services and 10 performance standards. These studies already provide a set of validated indicators to detect and rectify deficiencies in the care of headache patients, focusing on the level of specialised care.

This study aimed to integrate the different pathways and levels of care that coexist in the management of headache patients following the work initiated by other authors.<sup>5 15–19</sup> The analysis of barriers and quality standards was carried out considering the whole pathway, followed by the patients.

Health professionals, from different specialties, who participated in this study agreed to identify seven key subpathways in the care process of headache patients: PC consultations, emergency department, neurology department consultations, specialised headache unit consultations, hospitalisation and day hospitals/outpatients, to which a final category related to administration and management has been added. These subpathways are in line with the organisational proposals of care for headache patients.<sup>7</sup> The experience of the experts and the enormous coincidence with the rest of the health professionals involved in this study, coming from the different levels of care and management involved in providing care in the 'headache' process, have allowed us to establish a broad consensus on these findings.

The comparative analysis between the indicators defined in the Global Campaign against Headache<sup>15</sup> and those in our proposal indicates a high level of agreement, although each model has its particularities. First, the international proposal offers a global and broad vision of the determinants involved in the quality of specialised headache care, while our study structures the set of indicators according to the subpathways of the care process. Second, our proposal delves into the domains C (appropriate referral pathways) and I (safety of care) proposed by Peters *et al*<sup>15</sup> and does not contemplate others such as that referred to the convenience and comfort of the centre. Third, our study provides more specific indicators regarding treatments (opioids, triptans, oxygen therapy, etc) and patient profiles. Finally, we also include other aspects not covered by the SQE such as telemedicine, overuse or inadequate use of diagnostic tests, and governance and management indicators. In summary, both proposals present elements in common and differ in others that enrich each of the approaches making them complementary.

In this study, we not only identify the main subpathways of the headache process, but we study their potential

barriers and define those criteria and standards necessary to achieve adequate and safe care. For the six healthcare subpathways, the panel of experts and reviewers identified a total of 67 barriers that in their opinion prevent, or at least hinder, safe and quality care. The barriers identified as most frequent were concentrated in the Neurology Department's subpathway and were related to diagnostic errors and resource deficiency. This suggests that the implementation of the recommendations of the guidelines for headache treatment should be reinforced.<sup>6</sup> It is striking that these results indicate that a high number of medication errors (abuse or inappropriate prescription), an excess of complementary tests, and diagnostic errors continue to occur. Other studies support this data. For example, in Spain less than 20% of migraine patients receive the prescription of a triptan (of choice in the symptomatic treatment of moderate-intense crises), ergotics and opioids are still prescribed to a significant number of patients although we know that they induce headache chronicity and there is an underuse of preventive treatment.<sup>20</sup> As for diagnostic barriers, and probably due to an excessively sharp interpretation of the diagnostic criteria of the different primary headaches, the classification of the different headaches remains a problem for primary headaches, which is undoubtedly one of the causes that justify the excess of diagnostic tests, also identified as a barrier.<sup>21 22</sup> The results of this study, which identify the main barriers in the care pathway for headache patients, could help to introduce the necessary organisational modifications to achieve optimal quality of care following the standards that the European scientific literature has indicated as appropriate.<sup>5 15–19</sup> The implementation of these organisational measures could be facilitated by conducting a shared reflection involving all stakeholders in the headache care pathway, including patient representatives.

There are several reasons to try, as we propose in this work, to establish a care pathway for the headache patient process. Headache is, by far, the main cause of neurological consultation by frequency, at different levels of care (PC, neurology and emergency department).<sup>2 23–25</sup> The demonstration of the efficacy of botulinum toxin type A in patients with pathology as frequent and disabling as chronic migraine undoubtedly makes a better organisation of headache consultations in neurology departments necessary.<sup>26 27</sup> Finally, the advent of new therapeutic options, such as calcitonin gene-related peptide antagonists<sup>28</sup> or various neuromodulation devices,<sup>29</sup> which cost more than the current options, will force us to further optimise care for headache patients, especially at the level of hospital neurology departments.

This work also defined a large panel of 59 quality and 31 safety indicators in the process of headache patients. At a time like the present, in which the efficiency and sustainability of the healthcare system must prevail in the management of healthcare processes, and therefore, the health outcomes for patients, we believe that these results can serve as a basis when it comes to planning and



evaluating the 'headache' process at different levels of care, something that seems necessary in the immediate future.

### Limitations

This study was developed within the framework of the Spanish health system, so experiences in headache care may differ in other countries. The health structure and the organisational model of PC condition the identification of subpathways and barriers so that their generalisation to other health models should be carried out with caution. For example, not all countries have specialised headache units, and the role that nursing plays in health education and the mobilisation of patients to cope with the illness is quite different. It is possible that the proposal presented can be easily adapted in countries with a national health system as in Spain, while it cannot be extrapolated to countries with another care model. Furthermore, the non-participation of patients in the design of the pathway is also a significant limitation of the study. The care pathway described, developed under the premise of an integrated approach, should incorporate the patient's perspective to ensure person-centred care. In this study, we tried to minimise this bias by involving professionals with extensive experience in the management and care of patients who could provide information on the experience and perspective of patients.

### Conclusions

The design of the headache care pathway that is proposed as a result of this study advises establishing seven key moments or subpathways in healthcare provision. This design should consider the barriers that currently occur and prevent optimal quality and anticipate their limitations in providing high-quality care to this patient profile. In this regard, the experts who have participated in the group work came to agree that, although there are reference guidelines, they are not always used in a practical sense for very different reasons, ranging from budgetary to organisational issues. Finally, this proposal incorporates a set of quality indicators for each of the subpathways, with their recommended standards, which would allow professionals to know the levels of quality at different stages of care for headache patients.

### Author affiliations

<sup>1</sup>Service of Neurology, University Hospital Marqués de Valdecilla and Valdecilla Biomedical Research Institute, Santander, Cantabria, Spain

<sup>2</sup>Department of Medicine, University of Cantabria, Santander, Cantabria, Spain

<sup>3</sup>Headache Unit, Neurology Department, Vall d'Hebron University Hospital, Barcelona, Catalonia, Spain

<sup>4</sup>Headache Research Group, Vall d'Hebron Research Institute (VHIR), Universitat Autònoma de Barcelona, Barcelona, Catalonia, Spain

<sup>5</sup>Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO), Sant Joan d'Alacant, Valencia Region, Spain

<sup>6</sup>Department of Health Psychology, Miguel Hernández University, Elche, Valencia Region, Spain

<sup>7</sup>Emergency Department, Complejo Hospitalario de Vigo, Vigo, Galicia, Spain

<sup>8</sup>Neurology Department, Virgen del Rocío University Hospital, Seville, Andalusia, Spain

<sup>9</sup>Faculty of Medicine, University of Seville, Seville, Andalusia, Spain

<sup>10</sup>Headache Unit, Neurology Department, University Hospital of Albacete, Albacete, Castile-La Mancha, Spain

<sup>11</sup>Andalusian Agency for Healthcare Quality, Seville, Andalusia, Spain

<sup>12</sup>Department of Nursing and Physiotherapy, University of Cadiz, Cadiz, Andalusia, Spain

<sup>13</sup>Alicante-Sant Joan Health District, Alicante, Valencia Region, Spain

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**Competing interests** This study has been sponsored by Novartis, but no laboratory professional has been involved in the design of the work, recruitment of professionals, data collection and analysis, or in the interpretation of the results. The authors of the paper have developed the entire process of execution of the study independently.

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**Data availability statement** All data relevant to the study are included in the article or uploaded as online supplemental information. Data are available on reasonable request.

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### ORCID iDs

Patricia Pozo-Rosich <http://orcid.org/0000-0003-0796-4702>

Irene Carrillo <http://orcid.org/0000-0002-6981-7284>

Dolores Jiménez-Hernández <http://orcid.org/0000-0001-9424-6973>

Almudena Layos-Romero <http://orcid.org/0000-0002-6828-7808>

José Joaquín Mira <http://orcid.org/0000-0001-6497-083X>

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## Supplementary Material. Subpathway descriptive cards

| <b>SUBPATHWAY 1. Primary Care. Identification, therapeutic approach and possible referral to other care levels or departments</b> |   |
|---|---|
| <b>Description</b>  | Patient with headache as the main symptom and who attends G.P. consultation.  |
| <b>WHO intervenes</b>   | G.P. and nursing staff in Primary Care (in follow-up).  |
| <b>WHAT activities or interventions are contemplated</b>  | Diagnosis (includes differential diagnosis and request for tests), therapeutic approach, follow-up, and possible referral to the Neurology Department or Emergency Department. Healthcare education.                            |
| <b>BARRIERS TO QUALITY AND SAFETY, COMMON PITFALLS AND ERRORS</b>   | Non-use of a Reference Practice Guidelines (Fisterra or Guidelines to Good Clinical Practice in Migraine and Other Headaches OMC (Spanish Medical Colleges Association) / Ministry of Health).                                  |
|   | Diagnostic errors; The most frequent is diagnosing a migraine or a probable migraine as a tension headache.   |
|   | Ignorance and underutilization of the diagnostic criteria of the main primary headaches.  |
|   | Retention of patients who should be referred to specialists (underdiagnosed cases).   |
|   | Overuse of resources, resulting in cases being referred to neurology that should be addressed in Primary Care (e.g., low-frequency episodic migraine).  |
|   | Use of routine analgesics (e.g. Paracetamol) as a symptomatic treatment of migraine, which conditions abuse.  |
|   | Abuse or inappropriate prescription of opioids (e.g., Tramadol).  |
|   | Non-administration of preventive treatment to patients with migraine or frequent episodic tension headaches.  |
|   | Inadequate guidelines for treatment or improper taking of medication by the patient.  |
|   | Health education not being given by the nurse or doctor to the patient about a chronic disease such as migraines. There should be more courses or health education in Primary Care so that patients know how to control crises. |
| Not using quality of life questionnaires to determine the degree to which the pathology affects the patient's daily life.         |   |

|  | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b>               |
|--|---|------------------|--|
| <b>STANDARDS FOR ADEQUATE HEALTHCARE</b> | Use evidence-based clinical practice guidelines   | Dichotomous, yes | Audit<br>Medical record                    |
|  | Diagnosis of migraine in patients attending the surgery for headache  | >50%             | Medical record                             |
|  | Migraine patients treated with nonsteroidal anti-inflammatory drugs (NSAIDs) and Triptans as symptomatic treatment  | >90%             | Medical record                             |
|  | Patients with primary chronic headache (> 15 days/month) referred to Neurology  | 100%             | Medical record                             |
|  | Migraine patients in need of symptomatic treatment > 10 days a month, with preventive treatment   | >90%             | Medical record                             |
|  | Non-face-to-face consultation mechanism from PC to Headache Unit (mail, telephone specialist in Neurology) to avoid unnecessary referrals   | Dichotomous, yes | Audit<br>Documentation on center protocols |
|  |   |                  |  |
| <b>STANDARDS FOR SAFE HEALTHCARE</b>     | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b>               |
|  | Use of opioids in patients who attend the surgery due to headache   | <5%              | Medical record                             |
|  | Patients with > 10 days of analgesics/month due to headache without preventive treatment  | <5%              | Medical record                             |
|  | Headache due to daily abuse of medication   | <8%              | Medical record                             |
| <b>EVIDENCE</b>                          | <ul style="list-style-type: none"> <li>▪ Comité de Clasificación de la Cefalea de la International Headache Society (IHS). <i>III Edición de la Clasificación Internacional de las Cefaleas. Versión beta (marzo de 2013)</i>. Madrid: Sociedad Española de Neurología, 2013. <a href="http://www.sen.es/pdf/2014/cic3_beta.pdf">http://www.sen.es/pdf/2014/cic3_beta.pdf</a> (cited 2 Nov 2019)</li> <li>▪ Gil Campoy JA, González Oria C, Fernández Recio M, <i>et al</i>. Guía rápida de cefaleas. Consenso entre Neurología (SAN) y Atención Primaria (SEMERGEN Andalucía). Criterios de derivación. <i>Semerger</i> 2012;38:241–4.</li> <li>▪ Grupo de trabajo del Protocolo para el manejo del paciente con migraña crónica. <i>Protocolo para el manejo del paciente con migraña crónica</i>. Zaragoza: Ministerio de Sanidad, Servicios Sociales e Igualdad. Instituto Aragonés de Ciencias de la Salud (IACS), 2016. <a href="http://www.iacs.es/wp-content/uploads/2017/04/IACS_Protocolo_Migra%C3%B1a_Profesionales.pdf">http://www.iacs.es/wp-content/uploads/2017/04/IACS_Protocolo_Migra%C3%B1a_Profesionales.pdf</a> (cited 2 Nov 2019)</li> </ul> |                  |  |
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| <b>SUBPATHWAY 2. Emergency Department. Triage, assessment, treatment and referral to Primary Care or Neurology Department (General or Specialized Headache Unit consultation) or hospital admission</b> |   |
|---|---|
| <b>Description</b>  | Patient suffering headache who attends the Emergency Department.  |
| <b>WHO intervenes</b>   | Emergency Physician.  |
| <b>WHAT activities or interventions are contemplated</b>  | Triage, initial assessment (history and examination), possible complementary tests, treatment, and referral to Primary Care, Neurology Department, or specialized Headache Unit.<br>Patients admitted to the Emergency Department observation unit for assessment the next day by the Neurology Department or admission after cross-referral with Neurology/duty doctor when there is no Neurologist on call.   |
| <b>BARRIERS TO QUALITY AND SAFETY, COMMON PITFALLS AND ERRORS</b>   | Excessive delay to be treated (> 4h) due to emergency oversaturation or poor initial triage of patient.   |
|   | Excessive complementary tests (excess cranial CT scans).  |
|   | Not being able to ensure follow-up to the patient due to the subsequent delay in being attended by Primary Care or the Neurology Department where appropriate.  |
|   | Abuse of painkillers. Inappropriate abuse or prescription of opioids (e.g. Tramadol).   |
|   | Improper triage without pain scale and/or vital signs (Glasgow, Blood pressure), which implies establishing an inadequate priority in headache care. In many cases, for example, the intensity of pain is independent of the vital signs that are usually normal. Delay in care usually occurs in cases of "known pain." These cases do not usually have sufficient priority in the care provision of hospital emergency departments.<br>Not following "Manchester" triage flowcharts (or the existing triage system in each hospital). |
|   | Trivialize symptoms especially in young patients with "known pain" (pattern of analgesia or which may be increased without prior proper anamnesis). Consequent lack of identification of warning signs and possible secondary headaches.  |
|   | Emergencies are not a suitable area (due to usual conditions of noise and lighting in these departments) for the stay of these patients (both waiting for assessment and the period of treatment and medical observation).  |
|   | Inadequate referral to the emergency department from Primary Care of patients with headaches without warning CRITERIA.  |
|   | Re-admission to the Emergency Department of these patients at 72h for the same reason, or in the following 3 months for not solving their headache or not providing assessment/follow-up in Primary Care/Neurology Department.  |

| STANDARDS FOR ADEQUATE HEALTHCARE | CRITERIA (operational definition)   | Standard         | Source of information  |
|-----------------------------------|---|------------------|--|
|                                   | Perform an adjusted assessment of the urgency of each headache case (adaptation).   | 80%              | Medical record<br>Emergency Department Report  |
|                                   | Use evidence-based clinical practice guidelines both for the correct classification of headache and for rigorously performing the necessary complementary tests.  | Dichotomous, yes | Medical record   |
|                                   | Perform internal action protocols with multidisciplinary groups.<br>Schedule training activities focused on the management of patients based on evidence.<br>Establish effective communication channels between emergency physicians and neurologists.  | Dichotomous, yes | Audits<br>Records and management documentation<br>Record of training activities in the Teaching Unit |
|                                   | Admission time Emergency Department-doctor according to the type of emergency:<br>Resuscitation (red) Immediate attention<br>Very urgent (orange) 10 minutes<br>Urgent (yellow) 60 minutes<br>Standard (green) 2 hours<br>Non-urgent (blue) 4 hours<br>*always with the possibility of repeating triage if established time is exceeded or the patient's condition worsens. | 85%              | Medical record<br>Emergency Department Report  |
|                                   | Reassessment within 60 minutes after the first dose of analgesia in severe pain (VAS pain scale 7-10)   | 80%              | Medical record   |
|                                   | Discharge report and treatment plan   | 100%             | Medical record<br>Discharge report<br>An individualized treatment plan document                      |

| STANDARDS FOR SAFE HEALTHCARE | CRITERIA (operational definition)   | Standard                 | Source of information   |
|-------------------------------|---|--------------------------|---|
|                               | Safe use of medication avoiding adverse events. Leave a written record of any medication prescribed and time of administration.   | 90%                      | Medical record<br>Medication sheet<br>An adverse event reporting system             |
|                               | Avoid delays that cause risk of sentinel event (specify type):<br>Administration of contraindicated medication (e.g. due to patient allergies).   | No sentinel event occurs | Medical record<br>Adverse event reporting system or adverse reactions to medication |
|                               | Record of vital signs (blood pressure/temperature) in all headache patients.  | 100%                     | Medical record  |
|                               | Discharge report in writing with clinical judgment and detailed outpatient treatment plan.  | 95%                      | Discharge report<br>Audit   |
| <b>EVIDENCE</b>               | <ul style="list-style-type: none"> <li>▪ Fernández Fernández O, Macaya Ruiz A, Pozo Rosich P. <i>Guías diagnósticas y terapéuticas de la Sociedad Española de Neurología. Guía práctica diagnóstico terapéutica de la Cefalea del adulto y el niño en Urgencias</i>. Madrid: Luzán 5, 2016. <a href="http://cefaleas.sen.es/pdf/GuiaCefalea-adulto-nino.pdf">http://cefaleas.sen.es/pdf/GuiaCefalea-adulto-nino.pdf</a> (cited 30 Oct 2019)</li> <li>▪ Grupo de Trabajo SEMES-Insalud. Calidad en los servicios de urgencias. Indicadores de calidad. <i>Emergencias</i> 2001;13:60–5.</li> <li>▪ Ministerio de Sanidad y Política Social. <i>Unidad de urgencias hospitalaria. Estándares y recomendaciones</i>. Madrid: Ministerio de Sanidad y Política Social, 2010. <a href="https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/docs/UUH.pdf">https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/docs/UUH.pdf</a> (cited 2 Nov 2019)</li> <li>▪ Sociedad Española de Medicina de Urgencias y Emergencias. <i>Publicaciones digitales de SEMES</i> [Internet]. <a href="https://www.semes.org/prensa/boletines/">https://www.semes.org/prensa/boletines/</a> (cited 30 Oct 2019)</li> <li>▪ The College of Emergency Medicine. <i>Clinical Standards for Emergency Departments</i>. United Kingdom: The College of Emergency Medicine, 2014. <a href="https://www.rcem.ac.uk/docs/Clinical%20Standards%20and%20Guidance/Clinical%20Standards%20for%20Emergency%20Departments.pdf">https://www.rcem.ac.uk/docs/Clinical%20Standards%20and%20Guidance/Clinical%20Standards%20for%20Emergency%20Departments.pdf</a> (cited 30 Oct 2019)</li> <li>▪ Toledo JB, Riverol M, Martínez-Vila E, <i>et al</i>. Cefalea en urgencias. <i>An Sist Sanit Nav</i> 2008;31:75–85.</li> </ul> |                          |   |

| <b>SUBPATHWAY 3. Neurology Department (general consultations). A - Diagnostic and therapeutic approach of the headache patient</b> |   |
|--|---|
| <b>Description</b>   | Care pathway of the headache patient who attends the Neurology department sent from the Emergency Department, Primary Care consultation, or other hospital departments.   |
| <b>WHO intervenes</b>  | Specialist doctors in Neurology and Nursing staff.  |
| <b>WHAT activities or interventions are contemplated</b>   | Headache diagnosis: history, physical, and neurological examination.<br>Differential diagnosis: request for complementary tests (CT, MRI, arteriogram) or invasive procedures (lumbar puncture) in the corresponding departments (Radiology, Hospital admission, Day Hospital/outpatients).<br>Hygienic-dietary measures and pharmacological treatment of headaches.<br>Delivery of headache diary.<br>Detection of secondary complications (according to cases using MIDAS and HIT-6 scales).<br>Referral to SHU for advanced therapies. |
| <b>BARRIERS TO QUALITY AND SAFETY, COMMON PITFALLS AND ERRORS</b>  | Lack of physical resources.   |
|  | Excessive delays, both for first visit and check-ups.   |
|  | Short time per visit.   |
|  | Diagnostic delay, due to the foregoing.   |
|  | Diagnostic errors.  |
|  | Retention of complex patients who should be referred to a Specialized Headache Unit.  |
|  | Late reception of patients with complications that usually lead to excessive inadequate complementary tests, diagnostic errors, inadequate therapeutic tests, abuse of analgesics.  |
|  | Scant attention to socioeconomic factors that can turn pain into a chronic condition and hygienic-dietary measures that can improve it.   |
|  | Not providing documentation on treatment/care for the patient in writing.   |
|  | Absence of Headache Unit (neurologist, nurse, psychologist, rehabilitator, pain unit).  |
| Underestimation of pain.   |   |



|  |   |                  |   |
|--|---|------------------|---|
|  | Excess of complementary tests or improper use of the same.  |                  |   |
|  | Difficulty in accessing the patient's medical record.   |                  |   |
|  | Poor health education of the population, the survival of old myths about headache: eye pain, neck pain, etc.                        |                  |   |
| <b>STANDARDS FOR ADEQUATE HEALTHCARE</b> | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b>  |
|  | Use of clinical practice guidelines   | Dichotomous, yes | Audit<br>Medical record   |
|  | Referral of patients to Specialized Headache Unit with chronic migraine, candidates for botulinum toxin or other advanced therapies | >70%             | Medical record  |
|  | Attention to hygienic measures and comorbidities of chronic headache  | >70%             | Medical record  |
|  | Referral of complex patients/resistant to treatment   | Dichotomous, yes | Medical record  |
| <b>STANDARDS FOR SAFE HEALTHCARE</b>     | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b>  |
|  | Safe use of medication avoiding adverse events  | 95%              | Medical record<br>Adverse event reporting system or adverse reactions to medication |
|  | Proper use of diagnostic tests  | >75%             | Audit<br>Medical record   |
|  | Comprehensive completion of personal background   | >85%             | Audit<br>Medical record   |
|  | Use of the International Classification of Headache Disorders for diagnosis   | Dichotomous, yes | Medical record  |
|  | Use of quality of life scales   | Dichotomous, yes | Medical record  |

|          |  |
|----------|--|
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| <b>SUBPATHWAY 3. Neurology Department (general consultations). B -. Identification, therapeutic approach and possible referral in the Neurology Department, general neurologist to headache neurologist</b> |   |
|---|---|
| <b>Description</b>  | <p>Headache patient, who goes to the Neurology Department derived from the Emergency Department or Primary Care consultation and is referred to a headache neurologist. Patients referred from General Neurology to Specialized Headache Unit:</p> <ul style="list-style-type: none"> <li>- Primary headaches with diagnostic doubts.</li> <li>- High frequency chronic or episodic migraines resistant to at least 2 preventive treatments at appropriate doses, to propose treatment with botulinum toxin (omit this information). Review after the last preventive treatment prescribed before referral.</li> <li>- Atypical migraines: hemiplegic, ophthalmoplegic, retinal, with brainstem aura.</li> <li>- Trigeminal autonomic cephalalgias (cluster headache, PH, HC, SUNCT, and SUNA).</li> <li>- Other specific primary headaches (hypnic, nummular, tension, etc.).</li> <li>- Headache due to idiopathic intracranial hyper or hypotension.</li> <li>- Headache due to medication abuse not controlled.</li> <li>- Temporal arteritis.</li> <li>- Other secondary headaches, resistant to treatment.</li> <li>- Trigeminal neuralgia is resistant to two neuromodulators.</li> <li>- Occipital neuralgia and occipital nerve block therapy with a local anesthetic.</li> <li>- Neuralgia of terminal branches.</li> </ul> |
| <b>WHO intervenes</b>   | Neurologist   |
| <b>WHAT activities or interventions are contemplated</b>  | Diagnosis (includes differential diagnosis and request for tests), therapeutic approach, follow-up, and possible referral to Specialized Headache Unit. Health education, group approaches, delivery of headache diary, detection of secondary complications (MIDAS and HIT-6 scales). Relationship with Primary Care and Emergency Department.   |
| <b>BARRERAS A LA CALIDAD Y SEGURIDAD, HABITUALES FALLOS Y ERRORES</b>   | Lack of physical resources (doctor's surgery, preparation area). Conditions and characteristics of the consultations.   |
|   | Excessive delay (waiting list for consultation) The delay may be excessive unless there is a Consultation Guarantee Decree (maximum 60 days in some cases).   |
|   | Risk in quality of care provision due to a short time per visit.  |

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|  | Diagnostic shortfalls (e.g. diagnosis of migraine as tension headache).  |                  |   |
|  | Retention of patients who should be referred to Specialized Headache Unit (underdiagnosed).  |                  |   |
|  | Excessive complementary tests.   |                  |   |
|  | Combination of: NSAIDs, simple non-specific migraine analgesics (e.g. Metamizole), combined analgesics and opioids (e.g. Tramadol), Triptans, benzodiazepines, etc.                    |                  |   |
|  | Maintenance of patients with headache, mainly migraine, in this follow-up consultation, without referral to Primary Care.  |                  |   |
|  | Maintenance of headache patients, mainly migraine, in this follow-up consultation, without referral to a Specialized Headache Unit despite the inadequacy of monitoring at this level. |                  |   |
|  | Failure to comply with Guidelines and Recommendations on the Diagnosis and Treatment of Headaches.   |                  |   |
|  | Not giving written documentation about treatment/care to the patient.  |                  |   |
|  | Treatment readjustments by non-specialist doctors (for example, after a visit to the Emergency Department).  |                  |   |
|  | Absence of an approved calendar format.  |                  |   |
| <b>STANDARDS FOR ADEQUATE HEALTHCARE</b> | <b>CRITERIA (operational definition)</b>   | <b>Standard</b>  | <b>Source of information</b>  |
|  | Use of practice guidelines   | Dichotomous, yes | Audit<br>Medical record   |
|  | Delay in the attention of urgent consultations- a maximum of 3 days.   | 80%              | Consultation agendas of General Neurology Consultations. The number of patients with urgent appointments. The higher percentage in headache consultation than in general consultation for this condition.<br><br>The number of consultations in the emergency department due to headache. ICD-10 coding. The second reason for neurological consultation in the Emergency Department. |
|  | Delay in the first Neurology consultation - a maximum of 60 days   | >25%             | Record of Neurology agendas   |

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|                                      | Referral of patients from General Neurology to Primary Care for follow-up = registration in Neurology after a single visit   | 30%              | Registration of new patients on the system                |
|                                      | Referral of General Neurology patients to Specialized Headache Unit  | 10%              | Registration of new patients in Specialized Headache Unit |
|                                      | Have databases on patient response to treatment  | Dichotomous, yes |   |
|                                      | Official website of the GECSN (Headache Study Group of the Spanish Society of Neurology) and the Association of Patients should be the reference given to patients to seek information   | Dichotomous, yes | Patient Information                                       |
| <b>STANDARDS FOR SAFE HEALTHCARE</b> | <b>CRITERIA (operational definition)</b>   | <b>Standard</b>  | <b>Source of information</b>                              |
|                                      | Safe use of medication avoiding adverse events   | 95%              | Audit of medical records                                  |
|                                      | Proper use of diagnostic tests in primary headache (mainly neuroimaging)   | 90%              | Record of CT/MRI studies carried out for this reason.     |
|                                      | Inappropriate use of diagnostic tests in primary headache (mainly neuroimaging). <b>"Not to do"</b>  | <20%             | Audit of medical records                                  |
|                                      | Proper use of diagnostic tests in secondary headache (neuroimaging and other studies)  | 90%              | Records of imaging studies<br>Audit of medical records    |
|                                      | Comprehensive completion of personal background  | Dichotomous, yes | Audit<br>Medical record                                   |
|                                      | Use of headache digital records (app, web)   | Dichotomous, yes | Medical record  |
| <b>EVIDENCE</b>                      | <ul style="list-style-type: none"> <li>▪ Carrillo I, Pozo-Rosich P, Guilabert M, <i>et al.</i> Cartera de servicios y cuadro básico de indicadores de calidad para las unidades de cefalea: estudio de consenso. <i>Rev Neurol</i> 2019;68:118–22. doi: 10.33588/rn.6803.2018293</li> <li>▪ Comité de Clasificación de la Cefalea de la International Headache Society (IHS). <i>III Edición de la Clasificación Internacional de las Cefaleas. Versión beta (marzo de 2013)</i>. Madrid: Sociedad Española de Neurología, 2013. <a href="http://www.sen.es/pdf/2014/cic3_beta.pdf">http://www.sen.es/pdf/2014/cic3_beta.pdf</a> (cited 2 Nov 2019)</li> </ul> |                  |   |

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| <b>SUBPATHWAY 4. Specialized Headache Unit consultation. Request for complimentary tests, diagnosis, treatment, follow-up and possible hospital admission or referral to Day Hospital, Neurology Department or Primary Care</b> |   |                 |                              |
|---|---|-----------------|------------------------------|
| <b>Description</b>  | Headache patient referred from Primary Care, Emergency Department or Neurology Department   |                 |                              |
| <b>WHO intervenes</b>   | Neurologist   |                 |                              |
| <b>WHAT activities or interventions are contemplated</b>  | Request for complimentary tests (laboratory and imaging), diagnosis (anamnesis and exploration), treatment, follow-up, and a possible indication of hospital admission or referral to Day Hospital, Neurology department, other Services, or discharge to Primary Care. |                 |                              |
| <b>BARRIERS TO QUALITY AND SAFETY, COMMON PITFALLS AND ERRORS</b>   | Excessive delay (waiting list for consultation).  |                 |                              |
|   | Diagnostic shortfalls.  |                 |                              |
|   | Excessive complementary tests.  |                 |                              |
|   | Lack of hospitalization resources or impossibility of referral to Day Hospital in cases where such action would be adequate.  |                 |                              |
|   | Abuse or inappropriate prescription of opioids (e.g. Tramadol).   |                 |                              |
|   | Absence of Day Hospitals where patients with poor control can be referred to instead of the Emergency Department.   |                 |                              |
|   | Lack of uniform training in Emergency Departments.  |                 |                              |
|   | Unavailability of Triptans in many emergency departments of many hospitals.   |                 |                              |
| <b>STANDARDS FOR ADEQUATE HEALTHCARE</b>  | <b>CRITERIA (operational definition)</b>  | <b>Standard</b> | <b>Source of information</b> |
|   | Perform diagnosis for all patients  | 100%            | Medical record               |
|   | Administer the second cycle of OnabotulinumtoxinA to the patient with chronic migraine who shows no response to the initial cycle   | 95%             | Medical record<br>Audit      |
|   | Perform preventive treatment for all patients with chronic headache (except pregnancy)  | 95%             | Audit                        |

|                                      |   |                  |                              |
|--------------------------------------|---|------------------|------------------------------|
|                                      | Offer oxygen therapy to all patients with cluster headache  | 95%              | Audit                        |
|                                      | Refer all episodic controlled patients to Primary Care  | 95%              | Audit                        |
|                                      | A priority care of the pregnant patient in less than 10 days  | 95%              | Audit                        |
|                                      | Urgent care of cluster headache outbreak in <7 days   | 95%              | Audit                        |
|                                      | Establish a communication channel between the patient and the Headache Unit without the need for consultation (email/telephone) with time for it, for example, to communicate adverse effects or dose adjustments that do not need to take the time out of a face-to-face consultation.   | Dichotomous, yes | Protocol                     |
| <b>STANDARDS FOR SAFE HEALTHCARE</b> | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b> |
|                                      | Care by a specialized nurse at the Day Hospital   | 95%              | Human Resources Department   |
|                                      | Non-use of opioids  | 95%              | Audit                        |
|                                      | Comprehensive completion of personal background   | Dichotomous, yes | Audit                        |
| <b>EVIDENCE</b>                      | <ul style="list-style-type: none"> <li>▪ Carrillo I, Pozo-Rosich P, Guilbert M, <i>et al.</i> Cartera de servicios y cuadro básico de indicadores de calidad para las unidades de cefalea: estudio de consenso. <i>Rev Neurol</i> 2019;68:118–22. doi: 10.33588/rn.6803.2018293</li> <li>▪ Comité de Clasificación de la Cefalea de la International Headache Society (IHS). <i>III Edición de la Clasificación Internacional de las Cefaleas. Versión beta (marzo de 2013)</i>. Madrid: Sociedad Española de Neurología, 2013. <a href="http://www.sen.es/pdf/2014/cic3_beta.pdf">http://www.sen.es/pdf/2014/cic3_beta.pdf</a> (cited 2 Nov 2019)</li> <li>▪ Grupo de Estudio de Cefaleas de la Sociedad Andaluza de Neurología (SANACE). <i>Guía oficial de cefaleas 2019</i>. Madrid: Medea, Medical Education Agency S. L., 2019. <a href="http://www.saneurologia.org/wp-content/uploads/2019/03/Guía_Cefaleas_san-2019.pdf">http://www.saneurologia.org/wp-content/uploads/2019/03/Guía_Cefaleas_san-2019.pdf</a> (cited 2 Nov 2019)</li> </ul> |                  |                              |



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| <b>SUBPATHWAY 5. Hospital admission. Identification, therapeutic approach in Hospitalization</b> |   |                  |                              |
|--|---|------------------|------------------------------|
| <b>Description</b>   | Headache patient who is hospitalized after being referred from the Emergency Department or outpatient consultation.   |                  |                              |
| <b>WHO intervenes</b>  | Neurologist and nursing staff.  |                  |                              |
| <b>WHAT activities or interventions are contemplated</b>   | Diagnosis (includes differential diagnosis and specific diagnostic tests), therapeutic approach, and treatment of the underlying process (secondary headaches), referral to General Neurology, or Primary Care for follow-up. |                  |                              |
| <b>BARRIERS TO QUALITY AND SAFETY, COMMON PITFALLS AND ERRORS</b>                                | Lack of beds and consequent use of observation beds in the Emergency Department not enabled for the care of these patients.   |                  |                              |
|  | Excess of complementary tests.  |                  |                              |
|  | Abuse or inappropriate prescription of painkillers.   |                  |                              |
|  | Reconciliation of medications.  |                  |                              |
|  | Health education and advice.  |                  |                              |
|  | Inadequate communication.   |                  |                              |
|  | Management of expected patient admissions.  |                  |                              |
|  | Lack of protocols in place.   |                  |                              |
| <b>STANDARDS FOR ADEQUATE HEALTHCARE</b>   | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b> |
|  | Use of practice guidelines  | Dichotomous, yes | Audit                        |
|  | Follow-up and application of GECSSEN (Headache Study Group of the Spanish Society of Neurology) recommendations published in Neurology  | Dichotomous, yes | Audit                        |
|  | Establishment of internal protocols   | Dichotomous, yes | Audit                        |
|  | Carry out medication reconciliation upon discharge  | Dichotomous, yes | Audit                        |

|                               |  |                  |                              |
|-------------------------------|--|------------------|------------------------------|
|                               | Avoid repetitions of unnecessary tests   | < 5%             | Audit                        |
|                               | Protocolized pharmacology for emergency management of primary headaches  | Dichotomous, yes | Medical record               |
| STANDARDS FOR SAFE HEALTHCARE | <b>CRITERIA (operational definition)</b>   | <b>Standard</b>  | <b>Source of information</b> |
|                               | Adverse events related to medication   | <5%              | Medical record               |
|                               | Adverse events related to procedures   | < 5%             | Audit                        |
|                               | Unnecessarily prolonged admissions   | <8%              | Medical record<br>Audit      |
| EVIDENCE                      | <ul style="list-style-type: none"> <li>▪ Fernández Fernández O, Macaya Ruiz A, Pozo Rosich P. <i>Guías diagnósticas y terapéuticas de la Sociedad Española de Neurología. Guía práctica diagnóstico terapéutica de la Cefalea del adulto y el niño en Urgencias</i>. Madrid: Luzán 5, 2016. <a href="http://cefaleas.sen.es/pdf/GuiaCefalea-adultino.pdf">http://cefaleas.sen.es/pdf/GuiaCefalea-adultino.pdf</a> (cited 30 Oct 2019)</li> <li>▪ Grupo de trabajo del Protocolo para el manejo del paciente con migraña crónica. <i>Protocolo para el manejo del paciente con migraña crónica</i>. Zaragoza: Ministerio de Sanidad, Servicios Sociales e Igualdad. Instituto Aragonés de Ciencias de la Salud (IACS), 2016. <a href="http://www.iacs.es/wp-content/uploads/2017/04/IACS_Protocolo_Migra%C3%B1a_Profesionales.pdf">http://www.iacs.es/wp-content/uploads/2017/04/IACS_Protocolo_Migra%C3%B1a_Profesionales.pdf</a> (cited 2 Nov 2019)</li> <li>▪ Pozo-Rosich P, Martínez-García A, Pascual J, <i>et al</i>. Quality assurance in specialized headache units in Spain: an observational prospective study. <i>J Headache Pain</i> 2019;20:73. doi: 10.1186/s10194-019-1020-1</li> <li>▪ Toledo JB, Riverol M, Martínez-Vila E, <i>et al</i>. Cefalea en urgencias. <i>An Sist Sanit Nav</i> 2008;31:75–85.</li> <li>▪ Yusta Izquierdo A, Vázquez Miralles JM. Criterios de ingreso hospitalario de las cefaleas. Criterios de derivación desde la medicina de atención primaria hacia la especializada. <i>Medicine</i> 2003;8:5067–70.</li> </ul> |                  |                              |

| SUBPATHWAY 6. Day Hospital. Therapeutic approach in outpatients   |   |                  |  |
|---|---|------------------|--|
| <b>Description</b>  | Headache patient who is referred from the Specialized Headache Unit to the Day Hospital.  |                  |  |
| <b>WHO intervenes</b>   | Neurologist and nursing staff.  |                  |  |
| <b>WHAT activities or interventions are contemplated</b>          | A diagnostic and therapeutic approach (lumbar puncture, parenteral treatment).  |                  |  |
| <b>BARRIERS TO QUALITY AND SAFETY, COMMON PITFALLS AND ERRORS</b> | Lack of availability. Overcrowding of the Day Hospital with other resources belonging to other specialties.                     |                  |  |
|   | Scarce information on the patient's manifestation of pain throughout his/her treatment  |                  |  |
|   | Possible delay in the administration of long-term treatment.  |                  |  |
|   | Unscheduled or inappropriate education.   |                  |  |
| <b>STANDARDS FOR ADEQUATE HEALTHCARE</b>                          | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b>               |
|   | Use of practice guidelines  | Dichotomous, yes | Audit                                      |
|   | Following and applying GECSEN (Headache Study Group of the Spanish Society of Neurology) recommendations published in Neurology | Dichotomous, yes | Audit                                      |
|   | Periodic evaluation of the pain level of patients   | 95%              | Audit                                      |
|   | A communication channel between patient and nurse/neurologist of the Day Hospital   | Dichotomous, yes | Audit<br>Documentation on center protocols |
| <b>STANDARDS FOR SAFE HEALTHCARE</b>                              | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b>               |
|   | Adverse events related to medication  | < 5%             | Audit                                      |
|   | Adverse events related to procedures  | < 5%             | Audit                                      |

|          |  |
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| EVIDENCE | <ul style="list-style-type: none"><li>▪ Fernández Fernández O, Macaya Ruiz A, Pozo Rosich P. <i>Guías diagnósticas y terapéuticas de la Sociedad Española de Neurología. Guía práctica diagnóstico terapéutica de la Cefalea del adulto y el niño en Urgencias</i>. Madrid: Luzán 5, 2016. <a href="http://cefaleas.sen.es/pdf/GuiaCefalea-adulto-nino.pdf">http://cefaleas.sen.es/pdf/GuiaCefalea-adulto-nino.pdf</a> (cited 30 Oct 2019)</li><li>▪ Grupo de trabajo del Protocolo para el manejo del paciente con migraña crónica. <i>Protocolo para el manejo del paciente con migraña crónica</i>. Zaragoza: Ministerio de Sanidad, Servicios Sociales e Igualdad. Instituto Aragonés de Ciencias de la Salud (IACS), 2016. <a href="http://www.iacs.es/wp-content/uploads/2017/04/IACS_Protocolo_Migra%C3%B1a_Profesionales.pdf">http://www.iacs.es/wp-content/uploads/2017/04/IACS_Protocolo_Migra%C3%B1a_Profesionales.pdf</a> (cited 2 Nov 2019)</li><li>▪ Rohling S, Funk A, Ruscheweyh R, <i>et al</i>. Integrated headache care at the outpatient headache center of the University Hospital of Munich: The Munich model. <i>Clin Transl Neurosci</i> 2018;2:1–7. doi: 10.1177/2514183X18786844</li><li>▪ Sociedad Española de Neurología (SEN). <i>Plan Estratégico Nacional para el Tratamiento Integral de las Enfermedades Neurológicas II (PENTIEN II)</i>. Madrid: Sociedad Española de Neurología, 2016.</li></ul> |
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| <b>SUBPATHWAY 7. Governance and management</b>  |   |
|---|---|
| <b>Description</b>  | Headache patient at any level of care (hospitalized, primary, consultation, emergency, day hospital).   |
| <b>WHO intervenes</b>   | Administrators, managers, middle managers.  |
| <b>WHAT activities or interventions are contemplated</b>                                | <p>Guarantee material, human resources, and procedures to ensure adequate care of the headache patient.</p> <p>Ensure comprehensive and coordinated care (between care levels and units) and accessible (to care, diagnostic tests, etc.) for the headache patient.</p> <p>Ensure that professionals who participate in the headache patient care process have the appropriate professional skills.</p> <p>Guarantee the ongoing evaluation of structure, processes, and outcomes in the care of the headache patient, paying special attention to the patient's experience in their passage through the health system or to those elements that provide value for the patient.</p> |
| <b>GOOD PRACTICE IN THE CARE OF HEADACHE PATIENTS STANDARDS FOR ADEQUATE HEALTHCARE</b> | Definition of standards for adequate spaces and equipment for the care of headache patients.  |
|   | Definition of competencies of professionals who care for headache patients.   |
|   | Adequacy of response times.   |
|   | Definition of the organization for healthcare circuits / Definition of a patient care pathway.  |
|   | Incorporation of innovation in the care process through ICT (telemedicine, apps, etc.).   |
|   | Systematic procedures to inform patients about their health problems.   |
|   | Exploring patient expectations systematically.  |
|   | Priority healthcare circuits.   |
|   | A Care Plan that is communicated and constantly updated.  |
|   | Design of activities aimed at increasing resolution capacity (single act consultation, a consultancy with Primary Care, etc.).  |
|   | Unique identifiers to identify patients' clinical information.  |
|   | Application of an Annual Audit Plan for medical records.  |
| Indicators that evaluate the results of the headache care process.                      |   |

| Identification of risk points for patient safety in the care process.   |  |                                   |
|---|--|-----------------------------------|
| Annual Training Plan in the Unit.   |  |                                   |
| Definition of a process for the participation of professionals in the formulation of the objectives of the Headache Unit. |  |                                   |
| Patient Safety Plan in the Unit.  |  |                                   |
| Definition of the functions of posts held in the Headache Unit.   |  |                                   |
| Individual Development Plan for professionals in the Headache Unit.   |  |                                   |
| There is a system of control and updating the inventory of electro-medical equipment.                                     |  |                                   |
| Practice guidelines, protocols, and procedures that have been agreed upon and formally approved.                          |  |                                   |
| Written procedure about the control of storage and preservation of medicines and medical devices.                         |  |                                   |
| Systematic application of medication reconciliation procedures.   |  |                                   |
| Documented procedure for the reporting and management of safety incidents.  |  |                                   |
| Set of key indicators of the results of the Headache Unit and their monitoring.   |  |                                   |
| Tools to analyze patient satisfaction.  |  |                                   |
| <b>CRITERIA (operational definition)</b>  | <b>Standard</b>  | <b>Source of information</b>      |
| Professional Skills Map in Headache Units   | Dichotomous, yes                                       | Consultation/ Headache Unit Audit |
| The waiting list for access to headache consultation  | The waiting list in days for headache consultation < 7 | Hospital information systems      |
| Documentary existence of Headache Patient Care Pathway with inter-level consensus   | Dichotomous, yes                                       | Consultation/ Headache Unit Audit |
| % of Medical records with information on patient's pathology, evolution and therapeutic alternatives                      | >70%   | Audit Medical record              |

|                                      |   |   |                                   |
|--------------------------------------|---|---|-----------------------------------|
|                                      | Survey of patient expectations  | Number of improvement actions implemented | Consultation/ Headache Unit Audit |
|                                      | Survey on elements of value for the patient in their care process                     | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Procedure on Priority Care  | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | % of patients treated in a single act concerning the total number of patients treated | 50%                                       | Consultation/ Headache Unit Audit |
|                                      | Annual Audit Plan for Clinical Records in the Unit                                    | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Annual Training Plan in the Unit  | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Individual Professional Development Plan in the Unit                                  | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Procedure to control and update the inventory of electro-medical equipment            | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Formal approval procedure for practice guidelines, protocols and/or procedures        | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Set of key indicators for outcomes available (Scorecard)                              | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Patient Satisfaction Survey<br>Overall satisfaction with the care process             | 85%                                       | Patient surveys                   |
| <b>STANDARDS FOR SAFE HEALTHCARE</b> | <b>CRITERIA (operational definition)</b>  | <b>Standard</b>                           | <b>Source of information</b>      |
|                                      | Identification of critical safety points in the care pathway of the headache patient  | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Patient Safety Plan in the Unit   | Dichotomous, yes                          | Consultation/ Headache Unit Audit |
|                                      | Documented procedure for the reporting and management of safety incidents in place    | Dichotomous, yes                          | Consultation/ Headache Unit Audit |



|                 |   |                  |                                   |
|-----------------|---|------------------|-----------------------------------|
|                 | Written procedure about the control of storage and conservation of medicines and medical devices  | Dichotomous, yes | Consultation/ Headache Unit Audit |
|                 | Safety procedure for exposure to ionizing radiation in place  | Dichotomous, yes | Consultation/ Headache Unit Audit |
| <b>EVIDENCE</b> | <ul style="list-style-type: none"> <li>▪ Alberca Serrano R (coord.), Barranquero Beltrán A, Fernández de la Mota E, <i>et al.</i> Cefaleas: proceso asistencial integrado. Sevilla: Consejería de Salud, Junta de Andalucía, 2002. <a href="https://www.iuntadeandalucia.es/export/drupalida/salud_5af1956eb4b45_cefaleas.pdf">https://www.iuntadeandalucia.es/export/drupalida/salud_5af1956eb4b45_cefaleas.pdf</a> (cited 2 Nov 2019)</li> <li>▪ Carrillo I, Pozo-Rosich P, Guilabert M, <i>et al.</i> Cartera de servicios y cuadro básico de indicadores de calidad para las unidades de cefalea: estudio de consenso. <i>Rev Neurol</i> 2019;68:118–22. doi: 10.33588/rn.6803.2018293</li> <li>▪ Cramer H, Hehlke M, Vasmer J, <i>et al.</i> Integrated care for migraine and chronic tension-type headaches: A prospective observational study. <i>Complement Ther Clin Pract</i> 2019;36:1–6. doi: 10.1016/j.ctcp.2019.04.001</li> <li>▪ Gaul C, Brömstrup J, Fritsche G, <i>et al.</i> Evaluating integrated headache care: a one-year follow-up observational study in patients treated at the Essen headache center. <i>BMC Neurol</i> 2011;11:124. doi: 10.1186/1471-2377-11-124</li> <li>▪ Sánchez-del-Río González M. Organización de las unidades de cefalea desde un punto de vista multidisciplinar. <i>Rev Neurol</i> 2015;61:S21–6. doi: 10.33588/rn.61S01.2015215</li> <li>▪ Wallasch TM, Kropp P. Multidisciplinary integrated headache care: a prospective 12-month follow-up observational study. <i>J Headache Pain</i> 2012;13:521–9. doi: 10.1007/s10194-012-0469-y</li> </ul> |                  |                                   |