Drug-Related Problem Classification Systems

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OBJECTIVE: To provide an overview of and critically appraise classifications of drug-related problems (DRPs) for use during the pharmaceutical care process and research in pharmacy.

DATA SOURCES: A literature search was conducted using MEDLINE and Yahoo (January 2003) and manually. The search terms included DRP, drug-related problem, drug-therapy problem, and medicine-related problem.

STUDY SELECTION AND DATA EXTRACTION: English- and German-language articles on pharmaceutical care and DRPs were reviewed.

DATA SYNTHESIS: Most classifications of DRPs were identified through searching publications on pharmaceutical care and DRPs. Fourteen classifications with different focuses were found. Some classifications were hierarchical, categorized into main groups and subgroups. Various terminologies and definitions for DRPs were revealed, as well as guidelines for an optimal DRP classification. Classifications were assessed according to a clear definition, published validation method, and results reflecting process and outcomes, usability in pharmaceutical care practice, and a hierarchical structure with main groups and subgroups.

CONCLUSIONS: Finding DRP classifications by computerized search of the biomedical literature with the help of PubMed proved to be difficult. No classification could be found that met all of our criteria for an optimal system. Few classifications have been validated. Three have been tested as to their usability in practice and internal consistency. The Pharmaceutical Care Network Europe system Version 4 comes closest to the defined requirements.

KEY WORDS: classifications, drug-related problems, drug-therapy problems, medication errors, medicine-related problems, pharmaceutical care, pharmacotherapy.

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The identification, prevention, and solution of drug-related problems (DRPs), sometimes called medicine-related problems, are the core processes of pharmaceutical care. Any care activity to improve the use of medicines is designed to correct or prevent actual and potential DRPs, such as an adverse effect or interaction. Such actions and the underlying reasons for such DRPs should be documented as part of the care process. Classifying DRPs, therefore, is desirable for the development of pharmaceutical care practice and important for pharmaceutical care research. Documenting DRPs as part of the care process is essential; however, a well-constructed and validated instrument is lacking.[1] Validation is necessary to ensure that a code indeed reflects a unique DRP and will be understood by practitioners and researchers alike. A number of classifications are being used globally.

There are different ways in which such classifications are developed. In some cases, the cause of a DRP is separated from the problem itself; in other classifications, the problem also describes the cause. Some classifications also provide a coding system for interventions. Most modern classifications have an open hierarchical structure, where higher levels are broadly defined and lower levels become more specific. New subcategories also can be added in these systems. For example, in the Pharmaceutical Care Network Europe (PCNE) classification, P4 = drug use problem (main level), P4.1 = drug not taken/administered, and P4.2 = wrong drug taken/administered (sublevel).

Many of the different classifications have a different focus. Some classifications concentrate on the patient's perspective and the outcomes of therapy; others are oriented

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toward the process of prescribing, dispensing, and drug use. Also, some classifications are research oriented, while others are specifically developed for pharmacy practice or drug-use evaluation purposes.

In order to identify and classify those drugs implicated in DRPs, the World Health Organization (WHO) Anatomical Therapeutic Chemical coding system for drugs could be used.[2] Furthermore, the patient's gender and age should be documented at that time. Because of the complexity of DRPs, the option to enter free text should also be offered. Finally, in a system using such a classification, it should be possible to document if and when a problem has been resolved.

A proposal that DRPs should have their own chapter in the International Classification of Primary Care, produced by the World Organization of National Colleges, Academies, and Academic Associations of General Practitioners/Family Physicians, has emanated from Spain in 2002, but no decision has yet been taken.[3]

In 2002, Schaefer[4] described the 8 criteria that define a suitable coding system. With those criteria in mind, we defined 5 major requirements for DRP classifications as shown below.

1. The classification should have a clear definition, both for the DRP in general and for each DRP category.
2. The classification should have a published validation.
3. The classification should be usable in practice (has been used in a published study).
4. The classification should have an open, hierarchical structure (with main groups, subgroups, and an open structure to include new problems, preferably on subgroup levels).
5. The classification should have a focus on the drug-use process and outcome and separate the problem itself from the cause.

This paper identifies different classifications and discusses their suitability for documenting DRPs in pharmaceutical care based on these requirements. Furthermore, we sought to identify the system that best fits these requirements. The term "drug-related problem" is consistently used throughout the paper, as it is most frequently used in daily research and clinical practice.

Data Sources

Articles describing the development, testing, or use of classifications of DRPs were identified by a systematic search of the full MEDLINE database through PubMed. In addition, studies published on pharmaceutical care were screened with regard to any applied system used for classification of these problems.

In January 2003, a literature search was performed in MEDLINE (through PubMed). As "drug-related problem" is not a key word or MESH term, the free-text searching mode was used. The word "classification" is both a MESH term and subheader, but the term was also searched in free-text mode.

The first search was performed with the terms DRP and classification. The second search used drug-related problem and classification. A third free-text search was conducted with the term medicine-related problem or medicine related problem and the word classification. Additionally, a Yahoo search was performed using the key words drug-related problem and classification. No limitation for the year of publication was entered in all searches. Reading through recently published studies on pharmaceutical care identified further systems. The classifications identified were then assessed according to the defined criteria. In Appendix I, the main categories of the different classifications are listed.[4-17]

Data Extraction

Three of 10 hits in the first PubMed search structurally dealt with DRPs, and only one dealt with a DRP classification (Cipolle/Morley/Strand classification).[7] The abbreviation DRP proved not to be unique for drug-related problem. The second search resulted in 15 hits and identified the PI-Doc and the ABC system. The third search did not reveal additional systems. Within the 153 Yahoo hits, 3 documentation systems were retrieved (Cipolle et al.,[7] PCNE[15] American Society of Health-System Pharmacists [ASHP][6] classification). Therefore, most classifications were retrieved from manual searches of research reports and articles in the field of pharmaceutical care and drug-related problems. In Table 1, an overview of the 14 identified classifications and their critical elements for evaluation is given.[4-17] As few classifications have an official name, brief titles have been assigned, usually referring to the originating organization or researcher(s). The Pharmacist Practice Activity Classification V1 of the American Pharmaceutical Association was also retrieved, but that classification only deals with the pharmacist activities–not with DRPs.[18]

Two systems have been found in which the problem categories had separate definitions: the ABC of DRPs[5] and the Westerlund System.[17]

Further Information on the Classifications Identified

THE ABC OF DRPs

In 2000, Meyboom et al.[5] published a basic system for DRPs seen from a pharmacovigilance viewpoint. It is primarily for use in the WHO and focuses on side effects and adverse reactions. Within the system, DRPs are separated from dose-unrelated problems and appropriate use from inappropriate use. Each category has its own definition, but a general definition for a DRP is not given.

ASHP CLASSIFICATION 1996

In 1993, the American Society of Hospital Pharmacists accepted a statement in which a crude classification of DRPs was proposed, although it was not named as such.[19] That classification was broadly derived from a paper by Hepler and Strand.[10] In 1996, in a guideline for a standardized method for pharmaceutical care, the ASHP published

a more detailed classification.[6] DRPs were then defined as "medication-therapy problems." The statement of 1993 was reviewed again in 1998, at which time a medication-related problem was defined as "…an event or circumstance involving medication therapy that actually or potentially interferes with an optimum outcome for a specific patient."[19]

CIPOLLE/MORLEY/STRAND CLASSIFICATION

These authors do not use the term "drug-related problem," but rather "drug-therapy problem."[7] This concept generally refers to a system approach, including problems in the whole drug therapy chain, from the patient's perspective. The classification is in use in many community pharmacies in the US to evaluate pharmacists' activities in their daily provision of pharmaceutical care. The classification is most often referred to as the "Strand classification" because Strand et al.[20] published one version in 1999. Their definition does not seem to include potential DRPs and therefore can only be employed when the event has already been experienced by the patient.

DEFINITION: Any undesirable event experienced by the patient that involves or is suspected to involve drug therapy and that actually or potentially interferes with a desired patient outcome.

GRANADA CONSENSUS

In 1998, a group of Spanish experts reached a consensus on the definition and analysis of DRPs,[21] which was further revised in 2002.[8] In this latter system, potential problems are excluded and the definition focuses on negative clinical outcomes rather than on health problems of the patient in general. In the wording, this classification seems to focus ultimately on the patient's behavior. Based upon the definition, potential problems are excluded.

DEFINITION: Drug Therapy Problems are health problems, understood as negative clinical outcomes, resulting from pharmacotherapy, that for different causes, either do not accomplish therapy objectives or produce undesirable effects.

HANLON APPROACH

Hanlon et al.[9] have developed a method for assessing the appropriateness of medication based on the Medication Appropriateness Index (MAI). This tool for assessing a medication is based upon taxonomy of inappropriateness that, in turn, was based upon key elements identified from literature and clinical experience. The MAI has been used in several studies.[22,23] As inappropriate medication is, or may cause, a DRP, their classification is included here, but no definition of appropriateness of drug therapy is given.

HEPLER–STRAND CLASSIFICATION

With their seminal publication on pharmaceutical care, Hepler and Strand[10] also introduced several categories of DRPs. In this approach, problems and causes are not separated. This classification has also been used by other researchers in North America (eg, in Canada by Patel and Zed[24]) and was adopted in 1993 by the ASHP in their statement on pharmaceutical care.[19]

DEFINITION: An event or circumstance involving a patient's drug treatment that actually, or potentially interferes with the achievement of an optimal outcome.

Table 1. Overview of Classifications for Drug-Related Problems

System	Main Categories (N)	Based on Clear Definition	Hierarchical Problem Classification	Causes Classification	Validation Published	Intervention Classification	Used in Published Study
ABC[5]	3	N	N	I	N	N	N
ASHP[6]	13	Y	N	I	N	N	Y
Cipolle et al.[7]	7	Y	N	N	N	Y	Y
Granada consensus[8]	6	Y	N	I	N	N	Y
Hanlon[9]	10	N	N	I	N	N	Y
Hepler/Strand[10]	8	Y	N	N	N	N	Y
Krska et al.[11]	13	Y	N	N	N	I	Y
Mackie[12]	13	Y	N	N	N	N	Y
NCC-MERP[13]	14	Y	N	I	N	Y	Y
PAS[14]	5	N	Y	Y	Y	Y	N
PCNE[15]	6	Y	Y	Y	Y	Y	Y
PI-Doc[4]	6	N	Y	I	N	Y	Y
SHB-SEP[16]	10	N	Y	Y	N	Y	N
Westerlund[17]	13	Y	N	I	Y	Y	Y

ASHP = American Society of Health-System Pharmacists; I = cause integrated in the problem description; NCC MERP = National Coordinating Council for Medication Error Reporting and Prevention; PAS = problems, assessment, and solutions; PCNE = Pharmaceutical Care Network Europe; PI-Doc = problem-intervention documentation; SHB-SEP = Health Base Foundation Subjective Evaluation Plan.

KRSKA et al. SYSTEM

During a drug-use evaluation study,[25] Krska et al. developed a classification based upon the DRPs they encountered during a research project in 332 patients.[11] Like the Hanlon system, their classification is based upon drug-use evaluation. They use the term pharmaceutical care issue.

DEFINITION: A pharmaceutical care issue is an element of a pharmaceutical care need which is addressed by the pharmacist.

MACKIE CLASSIFICATION

Mackie[12] adapted the Cipolle et al. classification, based upon her own reporting of a random sample of 50 patients with one or more DRPs, and has used the resulting classification for her own research. She uses the term clinical drug-related problems.

DEFINITION: A clinical drug-related problem is considered to exist when a patient experiences or is likely to experience either a disease or symptom having an actual or suspected relationship with drug therapy.

NCC-MERP TAXONOMY OF MEDICATION ERRORS

This hierarchical classification by the National Coordinating Council for Medication Error Reporting and Prevention (NCC-MERP) also separates the problem ("Type" in their taxonomy, section 70) from the causes (section 80), but does not provide a clear intervention taxonomy.[13] The error section includes errors (potential DRPs) that do not become relevant for the patient. (The taxonomy itself can be downloaded as a PDF document from www.nccmerp.org/aboutmederrors.htm).

While the definition seems promising, the classification seems mainly process oriented and focuses especially on injectable administration of drugs in a nonambulatory setting. Obviously, nonpreventable DRPs are not included.

DEFINITION: Any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in control of the health care professional, patient, or consumer.

PAS CODING SYSTEM

The PAS coding originally was developed to document patients' questions on their drug therapy, not to classify all DRPs.[14] Problems, Assessment, and Solutions are classified separately.[26] The system is no longer supported.

PCNE SYSTEM (VERSION 4.0)

This hierarchical system comprises separate codes for problems, causes, and interventions and is hierarchically structured.[15] The original classification was created in 1999 by pharmacy practice researchers during a working conference of the Pharmaceutical Care Network Europe in an effort to develop a standardized classification system that is suitable and comparable for international studies. The first version was validated, resulting in Version 2.[27] The first version has been used in a Portuguese study.[28] Version 3 appeared in 2002 on the Internet after a revision by experts from different countries. In this version, the problem categories were brought in line with PI-Doc and the first Granada Consensus. Version 4 was published in 2003, also on the Internet, after a validation round in Portugal, Northern Ireland, and Malta. The classification, however, is still in its validation phase and will be further refined. It is currently in use in projects in Sweden and the UK.

DEFINITION: A drug related problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes.

PI-DOC

A hierarchical system for problem–intervention documentation was developed in Germany with an emphasis on the user-friendliness in community pharmacy practice.[4] The classification was first used in a study published in 1995[29] and has since then been used in several pharmaceutical care studies. It has been implemented in most German pharmacy-software systems. The classification is also in use in a study in Denmark in a slightly modified format.[30] Subcategories indicate the causes of a DRP.

SHB-SEP CLASSIFICATION

The Health Base Foundation (SHB; Houten, the Netherlands, www.shb.nl) developed this system in the Netherlands for use in pharmacy software.[16] It is based upon the medical SOEP structure (Subjective/Objective/Evaluation/Plan); however, the S and O codes have been combined into one problem description. The main problem categories comprise both a patient- and pharmacy-oriented perspective. The system is still being revised regularly, but each updated version is not sequentially numbered to facilitate differentiation from previous versions.

WESTERLUND SYSTEM

This system[17] has been developed as part of a PhD thesis and was first used in 1996.[31] Prior to incorporation into the nationwide Swedish community pharmacy software in 2001, the Westerlund system underwent minor amendments.[17,32] For self-medication, it has been available on a CD-ROM, but over-the-counter–related DRPs may now be documented in the same software as prescription problems.[33] The system includes an intervention classification and a manual for its use. All DRP and intervention categories are clearly defined. A national Swedish database will be introduced in Spring 2004 to collect and analyze DRPs based upon this system. The current definition upon which the classification is based is shown below.[34] This classification has also been used in a recent publication by Andersson et al.[35]

DEFINITION: A drug-related problem is a circumstance related to the patient's use of a drug, that actually or poten-

tially prevents the patient from gaining the intended benefit of the drug.

Discussion

IDENTIFYING CLASSIFICATIONS

It was difficult to comprehensively identify classifications of DRPs in the literature through PubMed. Only 3 systems could be retrieved that way. An additional Internet (Yahoo) search only retrieved systems that are published on the Internet. The *International Pharmaceutical Abstracts* database was not available to us, but may have been an easier source for identification of systems. The term "medication error" was not used for searching because it covers a different concept and is mainly used in the hospital setting.

The major problem proves to be the fact that classifications used are seldom published in a separate scientific article, but are hidden in reports that evaluate DRPs in practice. It is therefore unlikely that searches in different databases would have identified more classifications than we found using our strategy.

Some classifications do not provide a definition of a DRP; therefore, it is not clear what they attempt to classify. The definition should be an essential element of any classification. As became evident from our literature review, there are various terms describing problems related to the use of medications. Although it seems that the term drug-related problem is self-explanatory, different authors give different definitions and wordings for problems in pharmacotherapy, such as medication error or drug-therapy problem. Because the word "drug" in some countries also, or uniquely, refers to recreational drugs, a DRP is sometimes called a medication-related problem. In the world of health maintenance organizations and hospital pharmacy, the term "medication error" is used; however, this term focuses more on the physician or nurse as the person causing a specific error. It also implies that this kind of error can be avoided through structural adaptations of the healthcare setting. In contrast, DRPs refer more directly to the usually undesired outcome of a drug therapy seen from the patient's perspective, both actual and potential. The term "pharmaceutical care issue" describes DRPs' causes and interventions combined, and in that sense also describes DRPs. The term "preventable drug-related morbidity" is used as well, especially in the US, in the context of pharmaceutical care, but no classification based upon this term was identified.

Key questions in the discussion of the definitions include the following:

1. Should the problems "indication without a drug" or "untreated indication" be included in a classification?
2. Are potential problems DRPs?
3. Are unavoidable adverse drug reactions DRPs (eg, with cytostatic agents)?

The inclusion of a category of untreated indications into a DRP classification seems to be a logical consequence of many definitions. It describes the access to drug therapy or the degree to which a disease is treated effectively. In view of the principles of pharmaceutical care, the (clinical) pharmacist who usually assesses DRPs during a drug-use evaluation should have access to all relevant data concerning the patients' drug use, including diagnoses and laboratory values. From this viewpoint, it should certainly be part of a DRP classification.

However, the diagnosis is primarily the domain of the physician in most countries. The inclusion of this category may impede the acceptance of the classification system by other healthcare professionals, especially by physicians. Also, it can be argued that, if there is no drug, how can there be a DRP? But "untreated indications" should certainly be included in a classification of pharmaceutical care issues or DRPs.

Potential problems that affect the outcome of pharmacotherapy should be included in all classifications because it is the explicit aim of pharmaceutical care to detect DRPs before they do any harm to patients. Furthermore, they are almost always included in the different definitions. From this viewpoint, classifications that deal with the actual impact of problems only on outcome do not reflect all DRPs; this could be the critique of the much-used Cipolle et al. classification.

An unavoidable adverse reaction should also be part of a classification, because it is a DRP that cannot be corrected. However, adding other medication or reducing the dosage can possibly reduce its effect on the outcome.

VALIDATION

Data on the validation of DRP classifications are difficult to find. It seems that both internal and external validity have seldom been addressed. Usability in the practice setting, part of the external validation, is evaluated below.

Whether the problem descriptions are unique and complete, part of the internal validity has not often been sufficiently discussed. Even when a system has been developed from an inventory of DRPs, like the Krska and Mackie classifications, completeness is not guaranteed and overlaps may occur. Publications on the assessment of the internal validity can be found for the Westerlund, PAS, and PCNE classifications and are based on case descriptions and questionnaires.

Reproducibility by the same assessor could also be a measure for internal validity. Only the PAS system has been validated with regard to this aspect (with a 2-mo interval). Agreement is one of the elements that possibly reflects external reliability. This is, however, a difficult issue, as descriptions of the assessment of the external validity usually do not address the functionality of the system, but reflect the quality of the work of one assessor in finding the correct problem(s). Such studies have been described,[22] for example, with the Hanlon et al. system. The published validations used cases and showed many inter- and same-rater inconsistencies. These have to be addressed for all systems. Such inconsistencies can be partly attributed to

the lack of clarity of the cases used for validation, but also to the time needed for proper case reading and coding by the assessors who participate in the validation process.

USABILITY

One can argue that a DRP system should be as simple and suitable for practice as possible. However, since DRPs can hardly be described as simple, meeting such criteria would not provide enough information for practice and research.

If a classification section is hierarchical, the underlying level provides further description for the main code. But according to a usability study of the first version of the PCNE classification in Portugal, such a classification was still not easy to use in practice. Where short problem descriptions prevail, a pathway system should be developed to guide the use of the classification in practice as the Portuguese have done when they used the PCNE classification.[28]

The classification should also facilitate coding the cause of a DRP and the intervention by the care provider separately. Four classifications do not specify the cause. Seven classifications have largely integrated the cause of the problem into the problem description. Only the PAS, PCNE, and SHB-SEP classification systems have the option of classifying the causes separately. Krska has integrated the interventions in the classification, while 7 classifications provide a separate intervention taxonomy.

A validated and universal classification should be able to serve both research and practice, but for most classifications, the aspect of usability has not been explicitly studied except for the Westerlund[33] and PCNE[27] systems.

THE STRUCTURE OF A CLASSIFICATION

It appears that many researchers have felt that none of the existing systems would meet their own requirements sufficiently, and many alterations or adaptations of the principal classifications have been made. Provided that the basic structure of the main problem groups remains the same, results of different studies can be compared at least on the main level. This is the case for the basic structure of the problem sections of the PI-Doc and the PCNE classification systems. Because of their hierarchical structure, diversification is possible on the subgroup level. Furthermore, researchers can add categories on the subgroup level to meet their specific study requirements if necessary.

Most classifications only have a problem and intervention section, and the causes of a problem are included in the problem descriptions. Some classifications have a separate section for the causes of the problems. The Hanlon et al. approach provides no classification for problems, just mentions the causes for inappropriate pharmacotherapy.

Simply having a problem code is sometimes sufficient for certain scientific or economic evaluation purposes of pharmaceutical care practice and can be found in classifications such as the Hepler-Strand and Cipolle et al. classifications. But this is a difficult issue for practice. If the main problem is, for example, drug choice problem, the cause can be multiple such as too high daily dose or a potential interaction, or may even be a combination of those causes. Adherence problems are another good example. The apparent problem is a dosing problem. The cause can be found in the adherence behavior of the patient, but also in an unsuitable administration form. Thus, a problem code with an identified cause would provide more information about the nature of the DRP. As one DRP can have more causes, a classification that differentiates between problems and causes provides additional information about causes that otherwise had to be documented as unstructured text. With the approach of separating problems from their causes, potential DRPs may be eliminated from the classification system, although they are an important part of DRPs in practice. Eventually, some potential DRPs will lead to actual problems. In that sense, potential DRPs can be regarded as a drug-choice problem. In some classifications, such as PI-Doc and the PCNE classification, actual interactions have deliberately been placed in the problem section of the classification to improve usability and relevance of the classification, as well as the care process. However, their classification remains inconsistent because they are also drug-choice problems.

Most classifications do not offer a separate listing of interventions. The Krska et al. classification includes interventions, which seems logical in view of the fact that they classify pharmaceutical care issues, but not DRPs. The PAS, PI-Doc, PCNE, and Westerlund classifications also have a separate section on interventions.

FOCUS

From the classification and definitions, the focus for which a classification has been developed becomes clear. Most classifications have a more or less technical focus on the process of drug prescribing, delivery, and use, with the clearest case being the NCC-MERP classification. Drug-use evaluations form the focus for classifications, such as those of Hanlon et al. and Krska et al. The PAS, PI-Doc, Mackie, PCNE, and Granada systems concentrate on the experiences of the patient and outcomes. The SHB-SEP system is a mix of those 2 approaches. The ABC system is clinically orientated.

From most definitions, it is clear that a DRP and similar concepts are linked with the potential outcome of pharmacotherapy. Classifications, however, are clearly a part of the process of documentation for pharmaceutical care and primarily serve the health practitioner. They therefore should reflect both the process and possible impact on outcome in their focus.

Summary

Identifying DRP classifications is not easy because of the different terminologies used by various authors and institutions and the fact that such classifications are often only published when used in a study. In practice, the optimal DRP classification should lead to one choice of coding

only and therefore should be based on clear definitions, both for the DRP in general and for each DRP category. It should be validated and easy to use for research and clinical practice. It should be structured in a hierarchical manner, clearly separate causes from problems, and preferably also have an intervention section. Finally, the classification should focus on the process of pharmaceutical care and be based upon definitions that take the outcomes of pharmacotherapy into account. Currently, no such system is available.

Five of the identified systems are not based upon a definition. Only 4 systems are hierarchically constructed, and some form of validation has been published for only 3 systems. Although the PCNE system (Version 4) comes closest to the above-mentioned criteria, there are still some inconsistencies originating from its usability in practice that need to be further addressed. Due to the complex nature of many DRPs occurring in practice and the fact that they have a cause as well as a consequence, it is very difficult to develop a system that allows a consistent classification based on one choice only. Therefore, an additional set of rules for classification is needed for cases that are ambiguous.

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EXTRACTO

OBJETIVO: Proporcionar una revisión y una valoración crítica de la clasificación de los problemas relacionados con la medicación (PRM) para su utilización durante el proceso de atención farmacéutica e investigación en farmacia.

FUENTE DE INFORMACIÓN: La información se ha obtenido vía Internet y a través de la literatura sobre PRM y atención farmacéutica.

SELECCIÓN DE LOS ESTUDIOS Y EXTRACCIÓN DE LOS DATOS: Las búsquedas se han realizado mediante MEDLINE a través de PubMed y Yahoo, y manualmente en publicaciones en ingles y alemán sobre atención farmacéutica y PRM.

RESUMEN DE LOS DATOS: La mayoría de las clasificaciones se identificaron a través de búsquedas sobre atención farmacéutica y PRM. Se encontraron 14 clasificaciones con diferentes enfoques. Algunas de las clasificaciones se categorizaron en grupo principal y subgrupo. Se observaron diferentes terminologías y definiciones para los PRM, así como guías para una clasificación optima de los PRM. Las

Appendix I. Main Categories in Different Classification Systems of DRPs

ABC of DRPs[5]
- type A (drug actions) adverse effects
- type B (patient reactions) adverse effects
- type C (statistical) adverse effects

ASHP classification 1996[6]
- medication with no indication
- condition for which no drug is prescribed
- medication prescribed inappropriately for a particular condition
- inappropriate dose, dosage form, schedule, route of administration, or method of administration
- therapeutic duplication
- prescribing of medication to which the patient is allergic
- actual and potential adverse drug events
- actual and potential clinically significant drug–drug, drug–disease, drug–nutrient, and drug–laboratory test interactions
- interference with medical therapy by social or recreational drug use
- failure to receive the full benefit of prescribed therapy
- problems arising from the financial impact of therapy
- lack of understanding of the medication
- failure of the patient to adhere to the regimen

Cipolle/Morley/Strand classification[7]
- need for additional therapy
- unnecessary therapy
- wrong drug
- dosage too low
- adverse drug reaction
- dose too high
- adherence problem

Granada consensus[8]
- indication
  - patient does not use the medicines needed
  - patient uses medicines that he does not need
- effectiveness
  - patient uses an erroneously chosen drug
  - patient uses dose, interval, or duration inferior to the one needed
- safety
  - patient uses a dose, interval, or duration greater than the one needed
  - patient uses an agent that causes an adverse reaction

Hanlon approach[9]
- indication
- effectiveness
- dosage
- correct direction
- practical directions
- drug–drug interaction
- drug–disease interaction
- duplication
- duration
- expense

Hepler–Strand classification[10]
- untreated indications
- improper drug selection
- subtherapeutic dosage
- failure to receive drugs
- overdosage
- adverse reactions
- drug interactions
- drug use without indication

Krska et al. system[11]
- potential/suspected adverse reactions
- monitoring issues
- potential ineffective therapy
- education required
- inappropriate dosage regimen
- untreated indication
- no indication
- repeat prescription no longer required
- inappropriate duration of therapy
- discrepancy between doses prescribed and used
- potential drug–disease interaction
- other

Mackie classification[12]
- appropriateness
  - unnecessary therapy
  - no indication apparent
  - untreated indication
- safety
  - adverse reaction
  - clinically significant drug interaction
  - contraindication
- effectiveness
  - ineffective therapy
  - inappropriate choice of therapy
  - inappropriate formulation/delivery
  - inappropriate dose/dosing schedule
  - admitted nonadherence
  - monitoring required
  - miscellaneous

NCC-MERP classification[13]
- dose omission
- improper dose
- wrong strength/concentration
- wrong drug
- wrong dosage form
- wrong technique (includes inappropriate crushing of tablets)
- wrong route of administration
- wrong rate (probably relating to administration)
- wrong duration
- wrong time
- wrong patient
- monitoring error (includes contraindicated drugs)
- deteriorated drug error (dispensing drug that has expired)
- other

PAS coding system[14]
- choice of treatment
- patient-related factors
- pharmacotherapeutic issues
- communication issues
- miscellaneous

PCNE system (V4.0)[15]
- adverse reaction(s)
- drug choice problem
- dosing problem
- drug use/administration problem
- interactions
- other

PI-Doc[4]
- unsuitable drug choice
- unsuitable use by the patient
- unsuitable dosage
- drug–drug interactions
- adverse reactions
- other

SHB-SEP classification[16]
- patient initiative
  - doubts or insufficient understanding (also second opinion)
  - question about drug use (dosage/advice/way of use)
  - worries about complications/adverse reactions
  - self-care advice
  - advice on medical aids
  - information request (general/disease/complaint/disorder)
- pharmacy team initiative
  - administration
  - alterations in prescription (not based on medication-surveillance signal)
  - evaluation as result of a consultation by invitation
  - evaluation without patient consultation

Westerlund system[17]
- uncertainty about aim of the drug
- drug duplication
- drug–drug interaction
- contraindication
- therapy failure
- adverse effect
- underuse of drug
- overuse of drug
- other dosage problem
- difficulty swallowing tablet/capsule
- difficulty opening drug container
- other problem of administration/handling
- other

ASHP = American Society of Health-System Pharmacists; DRP = drug-related problem; NCC-MERP = National Coordinating Council for Medication Error Reporting and Prevention; PAS = problems, assessment, and solutions; PCNE = Pharmaceutical Care Network Europe; PI-Doc = problem-intervention documentation; SHB-SEP = Health Base Foundation Subjective Evaluation Plan.

clasificaciones se realizaron en base a una definición clara, la validación de los métodos y resultados publicadas, la inclusión de proceso y resultados, la utilidad en la práctica de la atención farmacéutica, y la existencia de una estructura jerárquica con grupos principales y subgrupos.

CONCLUSIONES: Resulta difícil encontrar clasificaciones de PRM mediante la búsqueda informática de la literatura biomédica a través de PubMed. No se encontró ninguna clasificación que cumpliera todos los criterios para un sistema óptimo. Pocas clasificaciones han sido validadas. Únicamente 3 han sido probadas en relación a su utilidad y consistencia interna. La Versión 4 del sistema PCNE se acerca a los requisitos definidos.

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RÉSUMÉ

OBJECTIF: Établir un aperçu et évaluer de façon critique la classification des problèmes reliés à la pharmacothérapie (PRP) utilisés dans la prestation des soins pharmaceutiques et dans la recherche en pharmacie.

SOURCE DES DONNÉES: Internet et la littérature sur les PRP et les soins pharmaceutiques.

SÉLECTION DES ÉTUDES ET EXTRACTION DES DONNÉES: Les recherches ont été effectuées dans MEDLINE, PubMed, et Yahoo ainsi que dans des publications en anglais et en allemand sur les soins pharmaceutiques et les PRP.

SYNTHÈSE DES DONNÉES: La majorité des systèmes de classification ont été identifiés dans des publications sur les soins pharmaceutiques et les PRP. Quatorze systèmes avec différents intérêts ont été identifiés. Quelques classifications étaient hiérarchiques et catégorisaient les PRP en groupes et sous-groupes. La terminologie variait, de même que les définitions des PRP et les recommandations visant à déterminer la classification optimale. Les classifications ont été évaluées en fonction des critères suivants: définition claire, validation des méthodes et des résultats, réflexion sur les procédures et les résultats, degré d'utilisation dans la pratique ainsi que la présence d'une structure hiérarchique en groupes et sous-groupes.

CONCLUSIONS: La recherche de système de classifications avec des méthodes de recherche électronique s'est avérée difficile. Aucun système n'a rencontré tous les critères optimaux pré-établis. Peu de systèmes étaient validés. Trois systèmes avaient évalué leur usage en clinique de même que leur utilisation systématique à l'interne. Le système PCNE version 4 était le système se rapprochant le plus des caractéristiques optimales.

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