Identification, prioritisation and assessment of obsolete health technologies. A methodological guideline

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List of abbreviations

DACEHTA: Danish Centre for Evaluation and Health Technology Assessment.

HTA: Health Technology Assessment.

EUnetHTA: European Network for Health Technology Assessment.

EuroScan: International Information Network for Health Technology Assessment.

FDA: Food and Drug Administration.

GENTecS: Grupo de Evaluación de Nuevas Tecnologías Sanitarias del Sistema Nacional de Salud.

CPG: Clinical Practice Guideline.

INAHTA: International Network of Agencies for Health Technology Assessment.

NHS: National Health Service.

NICE: National Institute for Health and Clinical Excellence.

SBU: Swedish Council on Technology Assessment in Health Care.

HT: Health technology.

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Glossary

Health technology: any set of medications, devices, and medical and surgical procedures used in health care, as well as the organisational and support systems within the context of which said care is delivered.

Obsolete health technology: any health technology in use for one or more indications, whose clinical benefit, safety or cost-effectiveness has been significantly superseded by other available alternatives.

Potentially obsolete health technology: any technology identified in any one of a number of ways which appears to have been superseded by other available alternatives and whose possible obsolescence should be rigorously assessed.

Health technology assessment: a form of research that examines the clinical, financial and social consequences, including any short- and medium-term consequences, as well as any direct, indirect, desired and undesired effects stemming from the use of any given technology.

Ineffective technology: any technology that has failed to demonstrate scientifically its usefulness for a specific indication.

Abstract

Introduction: At present there is a growing interest in obsolete health technology identification and assessment. A number of institutions are initiating activities targeted in this direction because the classification of given technologies as obsolete would amount to an important benefit for patients and health systems, in that patients would stop being treated with less effective or less safe technologies. Despite this growing interest, a negligible amount of literature has been published on the topic, as this is a little developed field in health technology assessment, and so a great part of the content matter of this guide has been based on expert opinion. The working group defined obsolete health technology as any health technology in use for one or more indications, whose clinical benefit, safety or cost-effectiveness has been significantly superseded by other available alternatives

Objectives: To propose a methodology for identification, prioritisation and obsolete health technology assessment.

Methods: We conducted a review of the scientific literature until April 2009 in specialised systematic review databases, such as HTA (Health Technology Assessment), DARE (Database of Abstracts of Reviews of Effectiveness), NHS EED (National Health Service Economic Evaluation Database) and the Cochrane Plus Library; and in general databases, such as Medline, Embase, IME (*Índice Médico Español*-Spanish Medical Index) and IBECS (*Índice Bibliográfico en Ciencias de la Salud*).

Furthermore, a number of databases and Internet search engines were reviewed, with special emphasis on the web pages of various national health technology assessment agencies and government bodies, particularly in the area of health services research. For perusal of the complete text, we selected records in which any type of obsolete technology was assessed or which contained opinions, ideas, advantages or limitations concerning any aspect linked to obsolete health technologies. There were no inclusion or exclusion criteria per se: instead, these records were selected on a consensus basis by two authors. In addition to the systematic review, a specific methodology was developed for each of the guide's 3 sections.

Results: This methodological guide proposes three differentiated sections for identification, prioritisation and assessment of potentially obsolete health technologies. For the first of these sections (identification), five potential

detection sources, classified as active or proactive, were established. Active sources include: 1) direct consultation of medical literature (in Medline-type databases); 2) consultation of new and emerging technology databases (EuroScan, GENTecS, Hayes, ECRI, ASERNIP-S); 3) consultation of systematic reviews published in the literature or by assessment agencies; and, 4) consultation with secretariats tasked with updating National Health System, hospital or regional service portfolios. Insofar as proactive systems are concerned, networks of health professionals would submit reports on potentially obsolete technologies to health technology assessment agencies or units. After probably obsolete health technologies had been detected by means of any of the above channels, the assessment agencies would then use a standardised procedure to confirm that the identified technology could be classified as potentially obsolete and be prioritised or, alternatively, assessed in cases where it had already been duly prioritised for the purpose.

To prioritise potentially obsolete health technologies for subsequent assessment, a prioritisation tool (PriTec tool) and a web application were created. This tool consists of three domains (population/end-users; risk/benefit; and costs, organisation and other implications) with a total of ten criteria. These domains have a weight on the scale of 36.7%, 36.7% and 26.6% respectively. Clinicians, managers and end-users participated in the weighting of the scale and selection of criteria. Using these results, a web application in Spanish and English, which is available and usable free of charge, can be accessed via the *avalia-t* web page (http://avalia-t.sergas.es/) or directly at www.pritectools.com or www.pritectools.es, and enables up to 50 potentially obsolete health technologies to be compared and prioritised for assessment purposes.

To assess a potentially obsolete technology, an assessment-document structure has been proposed, with different sections, centred on comparison of the benefits (in terms of efficacy and of safety, efficiency, cost or other implications) of the potentially obsolete versus the proposed alternative technology. The technology assessment section is based on a systematic review and should meet the requirements of being straightforward, methodical and reproducible.

Discussion: The guide can be used by different bodies interested in obsolete health technology assessment. All sections of the guide have advantages and limitations. The identification section should be used on a pilot basis to ascertain which sources of detection are most appropriate or efficient for identification of potentially obsolete health technologies. The prioritisation section enables a range of potentially obsolete technologies to be compared.

This is an initial version which can be improved over the course of time. It will be interesting to see how it performs and the degree to which it is used in settings other than Spain.

Conclusions and recommendations: To assess any obsolete health technology, a standardised process that enables identification, prioritisation and assessment of such technologies must be established. It is essential to determine the impact to be expected a priori from defining any given technology as obsolete, since the greater the impact, the more the health system will benefit from its assessment and subsequent exclusion.

1. INTRODUCTION

Health technology assessment (HTA) has traditionally been used to ascertain the efficacy, effectiveness and safety of new health technologies and to establish standards and recommendations in clinical practice. Although new procedures do not inevitably improve population's health, it is true that, with time, technologies which have already been implemented are progressively superseded by newly emerging ones. Consequently, some health technologies (HTs) will always be in the process of becoming obsolete, either because there are other technologies that are more effective, safer and cheaper or because other technologies combine some of these characteristics to a lesser or greater degree. There may be other aspects that cause technologies to fall into disuse, such as ethical aspects or the preferences of professionals, patients or society in general, though these are not such explicit reasons as those cited above for health organisations, which fundamentally focus on the effectiveness, safety and cost of health technologies. Nevertheless, when it comes to delivery of health services, institutions are increasingly taking patient and professional preferences into account, so that it is foreseeable that patient preferences may soon come to play a decisive role, and this will then contribute to the obsolescence of technologies.

Health technology is defined as the set of medications, devices and medical or surgical procedures used in health care, along with organisational and support systems within which such care is provided, whereas health technology assessment is the form of research that examines the clinical, financial and social consequences, including any short- and medium-term consequences, as well as any direct, indirect, desired and undesired effects stemming from the use of a technology (1). It is easy to fit assessment of potentially obsolete health technologies into both of these definitions, since in the case of obsolete health technology, the tag, "*and which has been superseded by other technologies*", would only have to be added to the preceding definition, and the same is applicable to the definition of assessment of potentially obsolete health technologies.

Many HTA agencies have emerging health technology detection systems, aimed at ascertaining the potential impact that a new health technology might have on the health system. The purpose of these systems is to ensure that health-care organisations can anticipate and be prepared for decision-making on the new HT's possible implementation. Almost all programmes designed to detect these technologies rely on different data sources for their identification, such as scientific literature, health professionals, congresses, etc. The products deriving from early identification of health technologies

are known as “brief reports”, “early warnings”, “alerts”, etc., and are brief documents that succinctly analyse these new technologies, focusing on their foreseeable impact on health care and organisation of health resources.

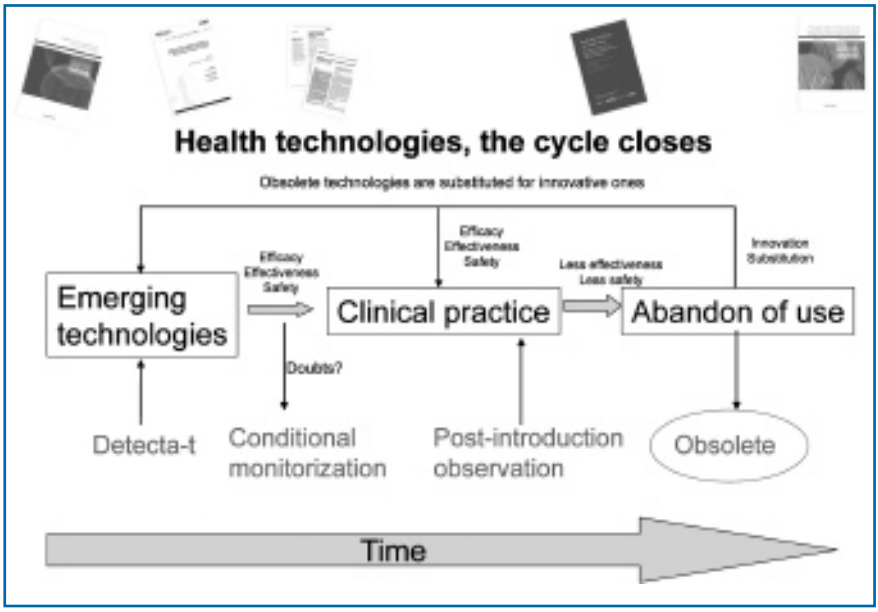
Just as there is a system for early detection and assessment of emerging technologies, there should be another that would enable detection and assessment of health technologies which may have become obsolete and ought to be evaluated using a mechanism similar to emerging health technology detection programmes. In addition to a mechanism for identifying technologies, an obsolete technology detection system would also need a prioritisation system, since there will be many obsolete technologies and a common methodology for assessment of such technologies. At all events, all potentially obsolete technologies should be assessed in accordance with standard HTA methodology, so that, provided the necessary requirements are met, these can be subsequently classed as obsolete technologies. As is the case with any assessment of a health technology, assessment of a potentially obsolete health technology must be irreproachable in its scientific rigour.

The first and foremost advantage of a system of these characteristics would be to furnish evidence for the possible withdrawal from clinical practice of procedures, devices, organisational systems, surgical approaches, etc., which gave rise to more adverse (or more severe) effects than did current treatment standards (e.g., cobalt pump versus linear accelerators in radiotherapy treatments). This would ensure that patients received far safer treatments. Adverse effects must be understood to mean, not only those that directly affect patients, but also those that affect the environment or healthy individuals (e.g., in screening programmes). The second advantage would be the withdrawal of technologies that were less effective than current treatment standards. This would translate as a direct benefit for the National Health System as well as a clinical benefit for patients. It would also reduce the time devoted to such obsolete health resources and make it available for more suitable health care. Thirdly, it would afford the advantage of optimising resources and allocation of health investment. Time devoted to these technologies would be more efficiently employed. However, there is nothing to guarantee that all this would necessarily mean a saving in health expenditure, since many of the new technologies are likely to be more expensive than the technologies classified as obsolete.

Implementation of a system designed to identify, prioritise and assess obsolete health technologies will enable the life cycle of any given health technology to be brought to an end. This cycle can be seen in Figure 1 and highlights the need to cover the gap that has existed until now in detecting

and recommending the exclusion from clinical practice of technologies that have been amply superseded by others.

Figure 1. Health technology cycle.



1.1. Justification for the guide.

Detection of obsolete health technologies is complex. Proof of this is the existence of different definitions of what is to be understood by obsolete health technology, with the term "obsolete" being different from "ineffective" or "inefficient".

At a global level, it was not until relatively recently that health organisations began paying real attention to obsolete health technologies. Excluding methodology pertaining to reduction in costs and use of marginal analyses for elimination of technologies in financially unsustainable systems -something that falls outside the goal of this guide- there is hardly any literature published on methodology suitable for being used for identification, prioritisation and assessment of obsolete health technologies. This reflects the need to have a guide which can be used by health organisations or professionals to assess obsolete health technologies, or even as a basis for drawing up their own guidelines to assess this type of health technology.

The document will provide guidance as to how potentially obsolete health technologies can be identified, which key aspects are to be taken into account when it comes to prioritising those technologies in most urgent need of assessment, and what the most essential aspects of such assessment are. In this latter section, the guide will set forth the structure that an obsolete health technology report should have and what information each section should contain.

1.2. Scope and goals of the guide.

This guide seeks to serve as orientation for the different aspects of obsolete health technology assessment and, in turn, to reflect what, according to the literature and the working group's recommendations or opinions, should be done to ensure proper detection, prioritisation and assessment of potentially obsolete technologies. The guide is based on the following definition of obsolete health technology, agreed upon by a working group made up of Spanish technical staff engaged in health technology assessment:

> Obsolete health technology: any health technology in use for one or more indications, whose clinical benefit, safety or cost-effectiveness has been significantly superseded by other available alternatives.
>
> According to this definition, for a technology to be deemed obsolete there must be an alternative that improves its overall outcome. By way of exception, however, a technology will also be deemed obsolete in a case where the alternative is no intervention whatsoever, and this latter course would prove beneficial for the patient.

Moreover, under the definition, an obsolete technology is, in principle, necessarily deemed to be obsolete for a specific indication, and so when assessments are made the technology must be cited along with the indication in question. Occasionally, there may be technologies that are obsolete *per se* for all indications (e.g., oncological treatments with radiotherapy devices which emit excess dosages and are upgraded).

It is also important to stress that an obsolete health technology is construed as being one which has been shown to be so after a thorough analysis of the scientific evidence. In this document, a difference will be drawn between "potentially obsolete" and "obsolete" technologies. A potentially obsolete technology is one which is indicated as being possibly obsolete (when

such obsolescence is identified) after the process of detection, while an obsolete technology is one which is shown to be obsolete following the issue of a report based on a systematic review.

This guide's priority target is to provide guidance for professionals or institutions that are interested in analysing obsolete health technologies in their respective health care contexts and may wish to explore some facet of this in depth, i.e., identification, prioritisation or assessment.

From its inception, the aim of this guide was to be applicable in both the public and private spheres as well as in different health care systems. It should be noted that, after some discussions, ineffective technologies were not included within the scope of this guide (ineffective technologies being those which have not shown their effectiveness but are routinely used in health care). Similarly, inefficient technologies do not come within the objectives of the guide: inefficient technologies are those whose benefit is obtained at the expense of a considerable consumption of resources (in terms of time, cost, staff or a combination of all three). This document is not targeted at disinvestment from technologies despite the fact that this is a secondary objective, since obsolescence is inescapably linked to disinvestment. However, the term "disinvestment" implicitly entails the assessment or connotation of cost-effectiveness, which is not the purpose of this guide.

1.3. Drafting, structure and end-users of the guide.

1.3.1. Drafting of the guide.

To enhance the project's internal and external validity, it was decided that the collaboration of other Spanish HTA agencies or units be sought. A technical working group was thus formed to develop, discuss, agree upon and make different contributions to the guide's various goals. Involvement of a number of health technology assessment agencies via members of their technical staff has helped lend the project greater visibility in each of its three aspects (identification, prioritisation and assessment). The working group acted both as consultant and as reviewer of the project, and acknowledges the content as being its own.

The agencies involved were: Galician Health Technology Assessment Agency (*Agencia de Evaluación de Tecnologías Sanitarias de Galicia/Axencia de Avaliación de Tecnoloxías Sanitarias de Galicia - avalia-t*), which coordinated the project; Health Technology Assessment Agency (*Agencia de Evaluación de Tecnologías Sanitarias*), Carlos III Institute of Health; Basque Office for Health Technology Assessment (Osteba); *Unidad de Evalua-*

ción de Tecnologías Sanitarias de la Comunidad de Madrid, Laín Entralgo Agency; and *Servicio de Evaluación del Servicio Canario de Salud*, Canary Islands. These agencies or units expressed interest in the project after its presentation for funding under the Quality Plan of the Ministry of Health & Consumer Affairs (*Ministerio de Sanidad y Consumo*). The collaboration of a hospital health technology assessment unit was likewise deemed relevant, with the Barcelona Clinical Hospital Innovation & New Technology Assessment Unit (*Unidad de Avaluació d'Innovació i Noves Tecnologies de la Fundació Clínic per a la Recerca Biomèdica/Hospital Clínic de Barcelona*) being included as an integral part of the working group.

Communication between the working group and the *avalia-t* technical group was conducted by telephone and e-mail. Similarly, a face-to-face meeting was held in February 2008 to present the project to the working group, along with various avenues and ideas for its development, designed to enable progress to be made on the methodological guide, and agreement was reached on the guide's goals and potential end-users. At this meeting, agreement was also reached on a work schedule and system for completing the project. These agreements were subsequently implemented by the *avalia-t* technical team, with the collaboration of Osteba.

Each of the guide's sections was developed in parallel: the obsolete technology identification section was drawn up, taking available data sources into account; the prioritisation section followed a consensus-based methodology using external panellists; and the section dealing with assessment of potentially obsolete technologies was drafted on the understanding that the goal of a report would be to highlight a technology's obsolescence by means of an easily comprehensible and rigorous technical assessment document.

The basis for the entire guide's sections was the completion of a very thorough systematic review. Multiple data sources were reviewed, with those of interest for the respective sections of the guide being included.

1.3.2. Guide structure.

This guide contains 3 sections which can be used independently, namely: 1) identification;2) prioritisation; and,3) obsolete health technology assessment. Each section follows a different methodology, and the general introduction to the guide is common to all three sections. Each section contains the following structure: Introduction; Objectives; Methods; Results; Discussion; and Conclusions. In the Discussion section, stress is laid on the advantages

and limitations of the recommendations made. Appendix I shows the systematic search conducted in a number of databases to locate information published on obsolete health technologies. The aim of this comprehensive search was to locate any type of document on obsolete HT, or comments or reflections on the importance of ascertaining and detecting these types of technologies. This search followed the standard work system routinely used by HTA agencies, with a certain degree of additional emphasis on the location of documents of other government agencies or institutions.

1.3.3. Guide end-users.

The proposed guide is targeted at all professionals who are interested in health technology assessment, at a national or international level, and who may be interested in the identification and assessment of obsolete technologies. This guide may also be used by hospital institutions, health services, insurance companies and other health-care bodies and institutions. Throughout the guide, standard HTA terminology has been used, and some specific aspects of health-database searching are discussed. This guide is proposed as a dynamic document which will be adapted and developed as the contexts of health-care information vary in line with the continuous improvement strategy pursued by the working group.

1.4. Legal framework in Spain.

The Law of Cohering and Quality of the National Health System (16/2003) (2) envisages the exclusion of a technique, technology or procedure included in the common service portfolio of the National Health System, where one or more of the following circumstances is present:

a) Evidence of a lack of efficacy, effectiveness or efficiency, or unfavourable risk-benefit;

b) Loss of health-care interest as a consequence of technological and scientific development or failure to show its usefulness; or,

c) Failure to meet the requirements stipulated by prevailing legislation.

The Royal Decree 1030/2006 considers these circumstances (3) and the Ministry of Health & Consumer Affairs Order (*Orden SCO*) 422/2007 of 21 November (4), which lays down the procedure for updating the common service portfolio of the National Health System, envisages the exclusion of technologies in the above-mentioned cases.

Some regional enactments, such as those of Galicia or the Basque Country Autonomous Region also provide, albeit not on a mandatory basis (5, 6), that in cases where the updating of the service portfolio is proposed, indication must be given as to any potential technologies that are going to be replaced when the new technology is introduced, thereby indirectly raising the obsolescence of technologies that are already in place. Similarly, the technology acquisition guideline of the Andalusian Health Technology Assessment Agency (Guía para la *Adquisición de Nuevas Tecnologías en los Centros Sanitarios de Andalucía – GANT*) envisages the possibility of identifying technologies that have been completely superseded by others (7).

Hence, in Spain there is a statutory framework that envisages the possibility of obsolete health technologies existing and these being excluded from the service portfolio through withdrawal of their funding. A system for identifying, prioritising and assessing potentially obsolete HTs would bolster this legal provision, thereby making it possible for citizens to receive the most appropriate health care and, moreover, for available resources to be allocated more efficiently. In addition, a great advantage of this system is that it would allow for rigorous assessment of scientific evidence on the efficacy and safety of a potentially obsolete technology.

1.5. International experiences and initiatives.

At a European level, the EUnetHTA's (*European Network for Health Technology Assessment*) recent proposal to the European Commission for a stable structure of health technology assessment in Europe acknowledges the importance of obsolete health technologies, indicating under the "Vision" section that, "new health technologies can be adopted and obsolete technologies abandoned in a well-informed and robust manner, hence bringing about high quality, safe, accessible, sustainable, ethical and efficient health care for citizens across Europe." Within the added value of inter-agency collaboration, it lays stress on, "sharing a variety of information on health technologies (from emerging to established and disinvested technologies)" (8).

Different institutions, such as the National Institute for Health and Clinical Excellence (NICE), Australian Government, Swedish Council on Technology Assessment in Health Care (*Statens beredning för medicinsk utvärdering - SBU*) and NHS Scotland, have recently acknowledged the importance of obsolete and ineffective health technologies. A 2008 European Observatory on Health Policies and Systems document entitled, "Ensuring value for money in Health Care. The role of health technology assessment

in the European Union" (9) indicates that there is a very limited HTA information for identifying areas of disinvestment and that more attention should be paid to identifying them, so that such ineffective and obsolete technologies do not remain in the health systems any longer.

In England, the NICE has shown interest in initiating a programme on ineffective treatments and, to this end, has entered into an agreement with the National Health Service (NHS) whereby the NICE will provide guidance, in this respect, on disinvestment from and identification of interventions in use which are not appropriate, effective or financially profitable (10). This initiative arose after the need had been voiced from different quarters for the NICE and the NHS to begin working on disinvestment (11), and also after the NHS had recommended that the NICE work with greater intensity on disinvestment and adopt an approach to cost-effectiveness similar to that used when it evaluates new technologies to cover ineffective technologies. On 6 September 2006, the NHS formally called on the NICE to launch a programme that would help it reduce expenditure on treatments that failed to improve patient care (12). As explained, rather than focus on aspects of cost-ineffectiveness, the aim of this guide is to highlight the lower effectiveness and safety of obsolete technologies, though we do recognise that disinvestment is a very important point in the assessment of such types of technologies.

The NICE has proposed three ineffective technologies to be analysed in greater depth (topical use of antibiotics for suspected acute bacterial conjunctivitis, tetracyclines for acne vulgaris, and topical use of combinations of antimicrobials and corticoids in superficial inflammatory dermatoses) (13). Within this ineffective technology analysis programme, the NICE will develop three types of products: assessment of technologies and clinical guidelines targeted at reducing ineffective practices; recommendation reminders (on ineffective technologies in existing NICE guidelines); and commissioned guidelines.

In a document on revising and extending its remit, the Scottish Health Technologies Group also recommends that health technology disinvestment activities be initiated (14). In the case of disinvestment, it indicates that, before embarking upon appraisal, "Topics for disinvestment might need an initial summary analysis of the degree of evidence available, and potential scale of cost saving, to determine whether an assessment/appraisal was justified".

Australia is one of the countries which, to date, has shown the keenest interest in obsolete technologies and disinvestment. Thus, the Regional Government

of Victoria sponsored a workshop to ascertain the response which disinvestment from health technologies might elicit. This same workshop also laid down certain guiding principles under which disinvestment from technologies should move forward (15).

At the University of Adelaide, Elshaug et al (16, 17) have made proposals regarding disinvestment from technologies. One of their papers (17) outlines the changes that must be made in political processes in order to meet the challenge of disinvestment from ineffective health technologies. The five key points to be resolved would be: 1) lack of resources to support disinvestment policy mechanisms; 2) lack of reliable administrative mechanisms to identify and prioritise technologies and/or practices with uncertain clinical and cost-effectiveness; 3) political, clinical and social challenges to removing an established technology or practice; 4) lack of published studies with evidence demonstrating that existing technologies/practices provide little or no benefit; and, 5) inadequate resources to support a research agenda to advance disinvestment methods. Subsequently, a qualitative study performed on 10 Australian health managers was published in 2008 containing their opinions on disinvestment from ineffective health practices. In this study, three priority topics are identified: a) lack of attention to existing practices is due to limitations in resources and methodological complexity; b) advance in disinvestment calls for expressly focusing on the saving of potential costs to be achieved through improvements in health care quality; and, c) financial support and collaboration are needed for advancing research into the methodological underpinnings associated with health technology assessment, and specifically with disinvestment from such technology.

Finally, in Canada, expressly listed among the functions of the Ontario Health Technology Advisory Committee is the withdrawal of obsolete health technologies (18, 19), though there is no indication as to the methodology used or even if this exists.

1.6. Expert opinion.

A range of opinions on obsolete technologies, expressed by a series of authors, can be found in the literature. Thus, Ancellin (20) is of the opinion that the obsolescence of a medical device is defined by: a) loss of its initial performance; b) development of medical techniques that may require a wide spectrum of performance; and, c) presence of new devices with enhanced safety. Plumridge (21) criticises the large amount of inefficient technologies used as well as the diversification of resources. Disinvestment from technologies is complex, requires resources and reveals the wide variations

that exist in medical practice coming under the area of health care. Despite these opinions, there is not much literature published that addresses the topic of obsolescence in health technologies in the terms envisaged in this document.

Another group of studies analyses specific health technologies as potentially obsolete. Some of these are shown in Table 1.

Table 1. Some technologies proposed as obsolete or ineffective.

Technology proposed as obsolete or ineffective	Comparator	Person or body proposing obsolete technology.
Extra-intracranial arterial bypass surgery for stroke-prevention treatment.	Not indicated (ineffective)	Medicare (22)
Thermography in breast cancer	Not indicated (ineffective)	Medicare (23)
Radiography of the lower back for non-specific pain in patients aged 20-49 years	Not indicated (ineffective)	Danish Centre for Evaluation and Health Technology Assessment (DACEHTA) (24)
Partial nephrectomy by open surgery for diverse indications	Laparoscopic nephrectomy	Abbou et al (25)
Rigid bronchoscopy	Flexible bronchoscopy	Montero-Cantú et al (26)
Active guidewire catheters for coronary arteriography	Passive guidewire catheters for coronary arteriography	Linnemeier (27)
Iterative tubo-ovarian surgery	*In vitro* fertilisation	Dequeste et al (28)

2. IDENTIFICATION OF POTENTIALLY OBSOLETE HEALTH TECHNOLOGIES.

2.1. Introduction.

Identification of potentially obsolete technologies is a fundamental part of this guide. Without a rigorous and reliable detection system it would not be possible for the more important ones to be prioritised and, as a result, this could lead to appraisal of obsolete technologies of scant interest in terms of the real benefit with their possible withdrawal from clinical practice.

In order to locate these technologies, it is essential to have data sources and search systems which are sensitive and yet specific, thereby fostering efficiency, in the sense that this enables interested parties to locate potential obsolete technologies for subsequent evaluation with the minimum possible effort.

2.2. Objectives.

To indicate the principal sources for locating obsolete health technologies and develop a possible protocol for identifying them.

2.3. Methods.

The proposals for detection of obsolete technologies were based on a series of ideas put forward by the working group. Five data sources were thus proposed for detecting potentially obsolete health technologies. To complete this information, Osteba and *avalia-t* contacted experts from INAHTA (International Network of Agencies for Health Technology Assessment), EuroScan (International Information Network on New and Emerging Health Technologies) and EUnetHTA (European Network for Health Technology Assessment) for advice on how and in which sources obsolete technologies could be detected.

As in the case of detection of emerging health technologies, methods for detecting these technologies can be divided into active and proactive searching. Whereas in active searching, it is the person interested in appraising these technologies that locate a potentially obsolete technology, in proactive searching the potentially obsolete technology is reported to the tech-

nical staff of agencies or institutions interested in a periodic and structured schedule.

2.4. Results.

The main sources that can be used for identification of obsolete health technologies are shown below. Figure 2 depicts the steps to be followed for confirmation of technologies as potentially obsolete.

2.4.1. Direct search of biomedical literature.

This would consist of a search of general databases, such as Medline, Embase, Web of Knowledge, etc., and specialised systematic review databases, such as the Cochrane Library Plus, NHS Centre for Reviews and Dissemination (which encompasses the HTA, Database of Abstracts of Reviews of Effectiveness/DARE and the National Health Service Economic Evaluation Database/NHS EED) to locate individual publications on an obsolete technology. In this case, the search could include terms pertaining to obsolescence and the like, or alternatively, terms referring to specific technologies, in order to locate papers on these which might highlight their obsolescence (Appendix I).

2.4.2. Review of health technology assessment reports.

HTA reports are characterised by systematically reviewing the scientific literature to ascertain the efficacy, effectiveness and safety of new health technologies. Such assessed technologies frequently tend to be diagnostic and therapeutic procedures. The results of these reports evaluate the new procedure against one or more already established procedures, indicating the potential advantages and limitations of the new technologies. HTA reports would therefore be a source capable of detecting potentially obsolete technologies, i.e., those superseded by the new technologies appraised. The added advantage of this type of document is that it is based on robust methodology, so that, in principle, certain aspects concerning the obsolete technology would only have to be completed for a report to be drawn up. To identify such technologies, one would only have to access the web pages of international and national HTA agencies or the INAHTA to locate reports posted by the organisation's member agencies.

2.4.3. Examination of new and emerging technology databases.

The clearest example of these databases is EuroScan (http://www.euroscan.bham.ac.uk/). EuroScan is an international organisation whose designated aim is to compile all the dossiers on emerging health technologies published by its member agencies. To this end, it keeps a database with partially restricted access to members (though with 65% accessible by the public). When information on an emerging technology is entered into this database, a number of fields are covered, and one of these refers to the new or emerging technology's function in its respective health-care system. Hence, indication must be given as to whether the new technology is an alternative to, complements or replaces an existing technology. In addition, the current treatment standard for the condition to which the new technology is applicable is specified. Accordingly, EuroScan, like other similar sources, such as the GENTecS group (*Grupo de Evaluación de Nuevas Tecnologías Sanitarias del Sistema Nacional de Salud*), could be a source of detection for obsolete health technologies, though the information on the above-mentioned fields is not always covered (it is not mandatory), and sometimes no indication is given as to whether or not the new technology replaces an existing technology. This is fundamentally due to the stage of development reached by the new technology in question, since in the early stages it is difficult to assign a specific function for the new or emerging technologies (29).

For instance, of the 1,129 entries recorded by EuroScan until 15 May 2008, a total of 274 (24.3%) had been designed as replacements. Of the technologies designated as replacements, almost half corresponded to drugs and a quarter to devices. Of the remainder, 14% were procedures and 9% were diagnostic tests (29). Other databases which contain information on new and emerging technologies and may therefore serve for identifying obsolete health technologies are Hayes (USA), the Emergency Care Research Institute (ECRI) (USA) and the Australian Safety and Efficacy Register of Interventional Procedures-Surgical (ASERNIP-S).

One possible strategy for identifying obsolete health technologies through emerging technology databases would be as follows: 1) start with the oldest technologies (introduced in 2000); 2) seek the most recent standard treatment (clinical practice guidelines, HTA reports, systematic reviews); 3) conduct a brief bibliometric study to ascertain the trend in the literature published on the potentially obsolete technology; 4) corroborate the situation of these technologies in the service portfolio; and, 5) ascertain clinicians' opinions about the technology. Once this has been done, the technology would be deemed potentially obsolete and a systematic review

would be undertaken to confirm this. This procedure could be used in all possible methods of detection of potentially obsolete technologies and compared to existing treatment recommendations.

2.4.4. Direct communication with clinicians and researchers. Obsolete health technology detection networks.

In the same way as many agencies have emerging health technology detection networks made up of health professionals who report the appearance of any potential new technology to the agencies (DETECTA-t, SorTek, Síntesis), these networks could be used to identify obsolete health technologies. Another possibility would be for potentially obsolete technologies to be identified by using the GENTecS alert networks, which encompass and co-ordinate Spanish agencies with emerging technology detection systems. Whenever one of the members of a detection network (or even any professional in a health organisation) believed that there was a potentially obsolete technology for a specific indication, he/she could report it to the relevant agency (or to GENTecS), which would assess this report (or notify the agencies, in the case of GENTecS). These networks could also be used in cases where agencies detect potentially obsolete technologies and consult the network's members (belonging to the speciality area in question) to confirm the potential obsolescence of such technologies. In this case, the detection network would be acting proactively.

Networks of this type have shown their usefulness when asked to identify obsolete health technologies. At a request from Osteba concerning the identification of obsolete technologies, 65 of the participants consulted identified 12 potentially obsolete technologies in two rounds, and two of these 12 potentially obsolete technologies had been analysed in a systematic review. These consultations are being regularly conducted, and a standardised procedure for identification of potentially obsolete technologies has been proposed in the Basque Country Autonomous Region.

2.4.5. Databases arising under prevailing legislation.

At present, Spanish health regulations envisage the exclusion of health technologies (RD 1030/2006) (30). Furthermore, the Ministry of Health & Consumer Affairs Order (*Orden SCO*) 3422/2007, which establishes the mechanisms for updating the NHS common service portfolio (4) lays down that, when the inclusion of a new technology is sought, the alternatives, if any, must be specified, along with an indication as to whether the new technology replaces them totally, partially or, in contrast, not at all. Moreover, some

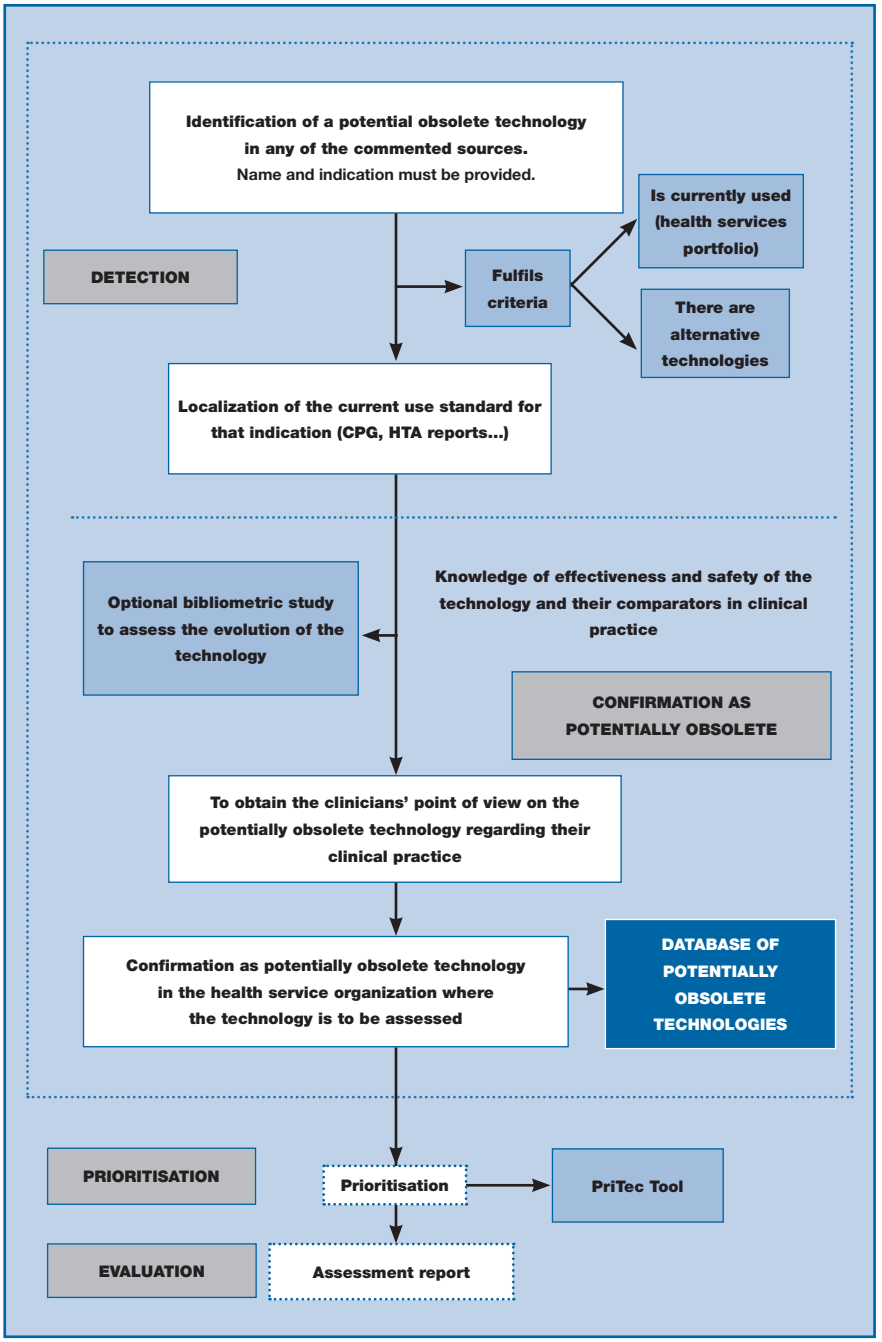
regional, e.g. Galician (5), regulations lay down that any new technology proposed must indicate, "any modifications that will ensue in the clinical management of patients with respect to currently available alternatives".

Accordingly, contact with all the secretariats of committees tasked with the introduction of new technologies, at both a national and regional level, could serve to identify potentially obsolete technologies. Furthermore, contact could also be made with hospital committees that usually use the GANT guideline (7) for the introduction of new technologies, or that use the GuNFT guideline (31) or other guidelines drawn up by hospital centres to ascertain which technologies are being proposed for replacement or withdrawal of funding respectively.

In order for this potentially obsolete technology identification procedure to function properly, it would be important to have a database with information on HTA hospital committees/units or secretariats of performance committees which use the above-mentioned health technology introduction or exclusion systems.

A similar approach would be to identify technologies that are withdrawn from clinical practice by a range of bodies, such as the US Food and Drug Administration (FDA), or European or Spanish Drug Agencies which generally issue safety alerts for withdrawal of medications.

Figure 2. Proposed systematisation of the detection and confirmation of potentially obsolete health technologies.



From the above figure, it can be deduced that there could be three stages in the identification and confirmation of obsolete health technologies. An initial stage would consist of preliminary identification of probably obsolete health technologies by means of any of the above-described sources of detection. Then, confirmation would be needed that the "probably obsolete" health technology did fulfil the criteria for being defined as such and was therefore "potentially obsolete". Classification of a health technology as potentially obsolete could be done by means of a brief document in the format of a technical dossier. Confirmation of such potentially obsolete technologies as truly obsolete would have to be accompanied by a far longer and more rigorous report, based on a systematic review (described in Section 4 below).

2.5. Discussion.

Identification of obsolete health technologies is difficult because there are no existing data sources specifically dedicated to locating them. Moreover, scientific literature always reports the outcomes of new technologies from the standpoint of the benefit to be afforded by these new techniques versus the best alternatives, and furnishes no information on the possible loss of benefit currently resulting from the use of out-of-date technologies. Another additional confounding factor is that, for most conditions or diseases, there tend to be more than one or two technologies used in their diagnosis or treatment, and it is therefore complicated to have a single standard of reference for comparing the effectiveness of a new versus another potentially obsolete technology.

There is no one common term that encompasses obsolete technologies, something that renders their detection enormously difficult. Hence, while not being exactly synonyms, in English an obsolete technology may be called "old-fashioned", "out of model", "disinvested", "obsolete", "superseded" and many more. Goodman has defined obsolete technology (obsolete/outmoded/abandoned) as that which is "superseded by other technologies or demonstrated to be ineffective or harmful" (32). Albeit very broad, this is nevertheless an interesting concept and also highlights the fact that it is extremely difficult to draw up generic search strategies which enable such potentially obsolete technologies to be detected. Indeed, search engines such as PubMed contain none of these terms as a MeSH term. This is why it would seem more reasonable for specific obsolete technologies to be designated before proceeding to consult general databases and search for indeterminate obsolete technologies. To this end, the use of networks of experts who report potentially obsolete technologies is extremely useful. Direct

contact with clinicians can furnish specific information about obsolete technologies connected with their specialist areas and, what is more, complete with a certain degree of contextualisation and detail. This will depend, both on the availability of the professional for providing the feedback and on the specialisation, since the number of potentially obsolete technologies will be variable. Accessing a large pool of obsolete technologies would call for contact with specialists engaged in all types of specialisations. These reports may well be influenced by the interest felt in incorporating new health technologies in a department, in order to renew those already in place.

Examining data sources that deal with new technologies and possibly indicate which technology can be superseded, as is the case of EuroScan, or examining requests for the incorporation of new technologies in the respective hospitals and health services, both regional and national, may prove useful. However, the information to be completed (technology to be replaced or supplemented) is not always covered, and sometimes, when such information is completed, this is not done with the degree of comprehensiveness required for being able to make use of it, since it is not felt that the field in question could serve for the detection of potentially obsolete technologies. In fact, the use of the prevailing legislation may not be all that useful because, when the incorporation of a new technology is proposed, available studies tend to compare the new technology to other already existing technologies, and, rather than being obsolete technologies as per our definition, such existing technologies tend to have been good treatment standards up to that point in time.

The proposed systematization for the identification would allow creating a database of potentially obsolete technologies and therefore generating alarms for users or health managers on certain technologies in use. This database could be accessible for the public and those organizations interested in obsolete technologies would feed it. Maybe this database would be more cost-effective than doing the prioritisation followed by a rigorous assessment, since many technologies would be detectable employing few resources.

In brief, the most appropriate way to identify potentially obsolete health technologies would be to make direct use of detection networks made up of specialists. These specialists can furnish information about potentially obsolete technologies, though it is likely that such technologies might not be very widely used in clinical practice, and so the impact generated by their assessment and subsequent exclusion from clinical practice would be low. Arguably, a more interesting strategy would be based on examining

top-quality systematic reviews or assessment reports, and there identifying potential, apparently superseded technologies. This would have two advantages: on the one hand, the potential technology identified would still be in use in clinical practice and so, in all probability, the impact of its withdrawal would be high; and on the other hand, the quality methodology of the review on which its identification were based would enable many of the questions possibly surrounding the obsolete technology and its characteristics to be answered.

2.6. Conclusions.

1. Detection of potentially obsolete health technologies is a complex procedure which should be ongoing and conducted in a programmed, systematic manner.

2. There are a number of different sources for the detection of obsolete health technologies, each with its respective advantages and disadvantages. Perhaps the most efficient are the use of detection networks made up of specialists; examination of requests for incorporation of new procedures in clinical practice; and examination of high-quality systematic reviews. The least advisable data source is a direct search of general Medline-type databases.

3. Once detected, a technology that appears to be obsolete must be confirmed as potentially obsolete before proceeding to conduct a systematic review which would enable it to be definitively classified (or not) as an obsolete health technology.

3. PRIORITISATION OF OBSOLETE HEALTH TECHNOLOGIES.

3.1. Introduction.

There are many obsolete health technologies that are being used in clinical practice to a greater or lesser extent. Pilot experiences conducted for this project indicate that, if a network of experts is asked to identify obsolete technologies, a number of these will indeed be detected (see Section 2.4.4 of this guide). However, not all such potentially obsolete technologies are going to have the same impact and, by extension, the same priority when it comes to being evaluated, for different reasons. In the first place, the most important reason for prioritising the assessment of a potentially obsolete technology is the expected impact of its funding being withdrawn. The greater the expected impact (impact being understood to mean a major reallocation of resources or a major improvement in a given procedure's safety or effectiveness), the higher the priority for assessing a health technology for definitive classification as obsolete. A technology also enjoys priority, even though it may be used on only a small number of patients (e.g., for a rare disease), if there is an alternative treatment which represents a substantial gain in quality of life for the patient.

Accordingly, two aspects have been highlighted which are important when it comes to prioritising the assessment of a potentially obsolete technology, namely: financial and organisational aspects; and safety. In addition, there are also aspects of an ethical and cultural nature and, needless to say, those pertaining to the technology's effectiveness.

When prioritisation activities affecting health are undertaken (investment, allocation of budgets, disinvestment, or exclusion from the service portfolio), it is essential to have access to the opinions and assessments of persons who use and manage health services (administrators/managers, clinicians and end-users), since a broader overview is thus obtained of those aspects which such people would consider most important for the purpose of prioritising obsolete health technology assessment.

The working group agreed to use a specific qualitative methodology for the prioritisation of potentially obsolete health technologies, certain aspects of which were applied by the technical team. The developed methodology makes it possible to integrate the opinions of managers, clinicians and end-

users in different autonomous regions, who were selected at the suggestion of the members of the working group.

3.2. Objectives.

To develop a tool for prioritising obsolete health technologies, bearing in mind the importance attributed by managers, clinicians and end-users to safety, effectiveness, and organisational and financial aspects of potentially obsolete health technologies.

3.3. Methodology.

A brief description is given below of the methodology used to create the obsolete health technology prioritisation tool.

3.3.1. Choice of methodology.

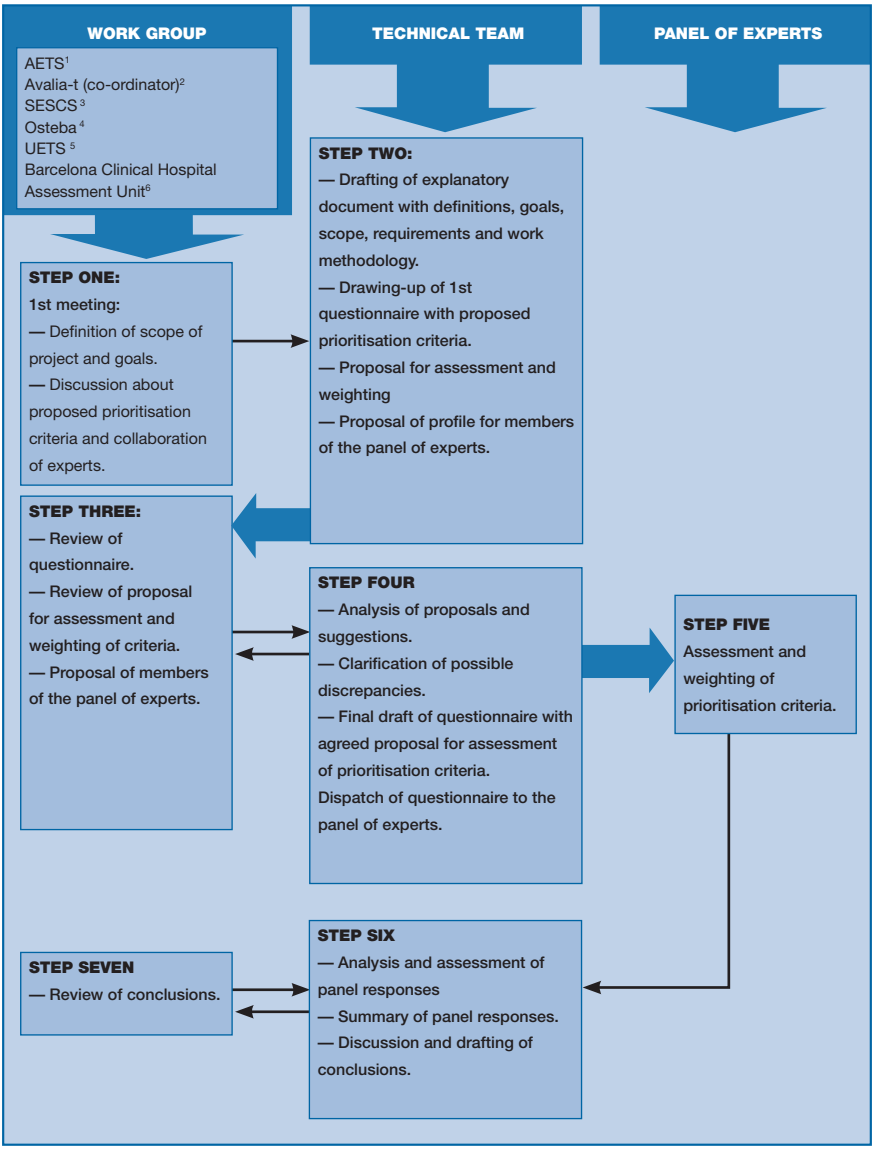
To prioritise obsolete health technologies, 3 work levels were defined, each with its specific tasks (see Figure 3). These work levels were:

- Technical team: made up of technical staff from avalia-t, tasked with drawing up the prioritisation subproject.

- Working group: made up of experts from the participant assessment agencies and units. This group analysed the prioritisation criteria and conducted a preliminary evaluation of their inclusion or exclusion. The working group and technical team proposed the component members of the panel of experts.

- Panel of experts: made up of persons exclusively chosen to participate in the process of prioritisation of potentially obsolete technologies. The members of the panel of experts selected, scored and weighted the final prioritisation criteria.

Figure 3. Methodology for prioritisation of obsolete health technologies.



[1]Health Technology Assessment Agency, Carlos III Institute of Health; [2]Galician Health Technology Assessment Agency; [3]Canary Island Health Assessment Department; [4]Basque Office for Health Technology Assessment; [5]Madrid Regional Health Technology Assessment Unit, Laín Entralgo Agency; [6]Barcelona Clinical Hospital Innovation & New Technology Assessment Unit.

3.3.2. Choice of prioritisation instrument items and domains.

The technical team selected a series of items to be used as prioritisation criteria. Dating from the dispatch of the preliminary prioritisation criteria, the members of the working group then had 15 days to make their assessments and comments. Eighteen prioritisation criteria divided into 4 domains were initially selected, and these were then sent to the members of the working group for their assessment. The working group decided that four of these items were to be eliminated. Finally, 14 criteria were included in the prioritisation questionnaire sent to the panellists. Two versions of the prioritisation criteria were drawn up: one for panellists in the clinical and management area, with more experience in health terms; and another, with terminology adapted to health-care system end-users, to make it easier to understand the technical jargon used.

The prioritisation criteria sent to panellists were classified into 4 domains, namely: a) population/end-users (4 elements); b) technology (3 elements); c) risk/benefit (3 elements); and, d) costs, organisation and other implications (4 elements).

3.3.3. Selection of criteria, and selection and profiles of panellists.

Panellists were selected by the members of the working group among health-care system clinicians, managers and end-users, and an attempt was made to ensure that the composition of the panel struck a balance with respect to these three groups. The panellists were thus persons drawn from Spain's respective autonomous regions. Among the clinicians, an effort was made to ensure that there was representation of practitioners involved in both primary and specialised care and that, within the specialist group, there were highly technological specialisations. Among the managers, value was attached to the presence of hospital administrators and administrators of central services of the Regional Health Authorities (and among the latter, those most closely linked to the service portfolio, i.e., health care, health assurance, public health, etc.). Finally, among the system end-users it was sought the presence of patient associations, consumer and end-user organisations, expert advisory groups and community participation groups.

Each agency or working group unit chose 6 to 9 potential panellists to participate in the prioritisation process. The task assigned to the panellists was that of selecting the final criteria from among the 14 proposed prioritisation criteria. These criteria were scored from one to nine in accordance with their importance in the panellist's view. In addition, panellists were asked to allocate a weight to each of the four domains in percentage terms, so as to

be able to weight the importance of each of the prioritised technologies. A total of 37 panellists were contacted, made up of 13 clinicians, 14 managers and 10 end-users.

3.3.4. Item and domain scores and weightings. Analysis of results.

The *avalia-t* secretariat contacted the panellists individually by telephone or e-mail, in order to invite them to take part in the project and explain its purpose. To maximise participation, the number of contact attempts per panellist was variable. All prioritisation questionnaires were sent and received by e-mail.

Once the scores and weightings had been received by *avalia-t*, the responses were analysed and each domain weighting was calculated. The results were forwarded to the working group for comment and discussion.

Scores were classified into: a) 7-9 points, clearly important criterion; b) 4-6 points, criterion with doubts regarding its importance; and, c) 1-3 points, criterion of little importance. Where any element received a median score of 3 or lower, it was excluded from the prioritisation criteria.

3.3.5. Development of prioritisation tool.

After the prioritisation scale had been agreed upon and finalised, it was decided that a software application, known as the PriTec tool, be created, so that scores received by several potentially obsolete technologies could be compared and the technologies then prioritised. This application, funded by the Galician Health Authority's Directorate-General for Health Assurance & Planning (*Dirección Xeral de Aseguramento y Planificación Sanitaria de la Consellería de Sanidade*, Galicia), complements the work done by the technical team and working group. The application displays the results both quantitatively and graphically. It enables technologies to be assessed on the basis of pre-established criteria and the results obtained after weighting the domains to be calculated. In addition, it also allows for comparison of the scores received, both overall or broken down by domain, for each technology assessed. This tool can be accessed at the websites http://www.pritectools.es or http://www.pritectools.com, and is available for public use, free of charge, to all those wishing to use it.

3.4. Results.

3.4.1. Participation.

Of a total of 37 panellists contacted, 33 (89.2%) agreed to participate. Of these 33, 29 (87.8%) finally returned the completed questionnaire. Among those participating, there were 12 managers/administrators (41.4%), 11 clinicians (37.9%) and 6 end-users (20.7%). In all, there were 18 men (62.1%) and 11 women (37.9%).

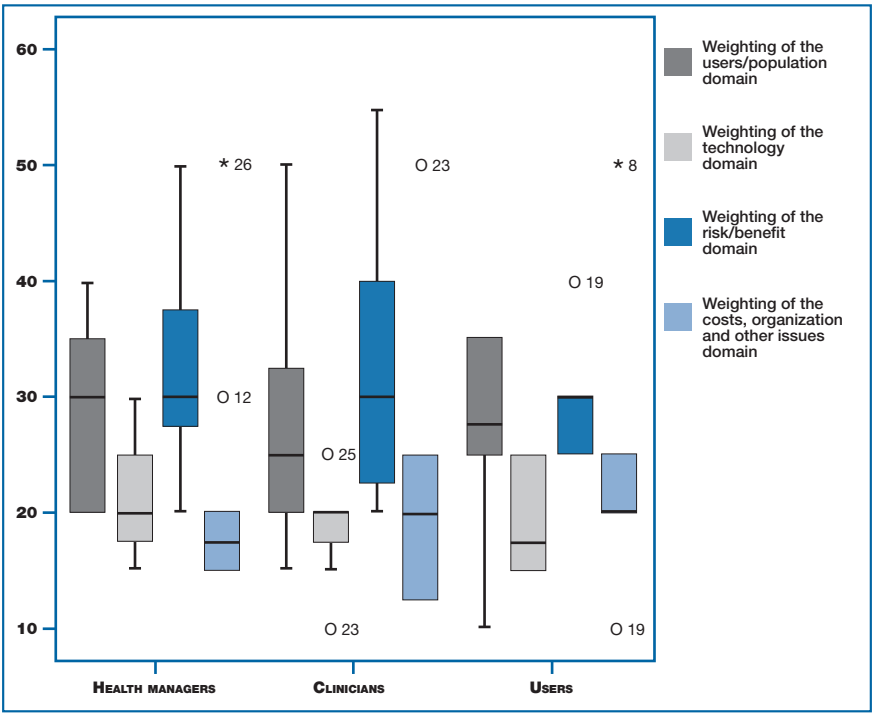
3.4.2. Prioritisation criteria and weighting of domains.

Of the 14 criteria proposed for inclusion in the tool, 3 proved doubtful, with a median score of 6 points. After consulting the working group, it was decided that these 3 criteria should be excluded from the tool. The remaining questions received median scores of 7 to 8 points (one received a score of 9). Insofar as weighting was concerned, the population/end-users domain received a weight of 30%, that of technology 20%, that of risk/benefit 30%, and that of costs, organisation and other implications 20%.

3.4.3. Results by reference to panellist profile.

The following figure shows the weightings for each domain according to panellist profile. There were no significant differences in the weightings allocated to the different domains according to panellist profile, and perhaps the most noticeable fact was that clinicians scored the population/end-users domain the lowest, while managers were the ones who awarded the lowest scores to the aspects of costs, organisation and other implications. In terms of gender, there were no important differences in the weighting of the domains, with the maximum differences being 5 percentage points. Shown in Figure 4 are the domain scores awarded by panellists according to their group affiliation.

Figure 4. Domain scores according to panellist profile.



3.4.4. Final domains and weighting.

After having analysed all the responses of the panellists, the resulting 11 criteria and 4 domains were reduced to 10 criteria and 3 domains. Elimination of an extra criterion (technological alternatives, defined as "authorised technological alternatives existing for the same indications as the potentially obsolete technology") was due to the fact that there was overlapping between this criterion and the definition of obsolete technology itself, so that it was eliminated. On this criterion being eliminated and the other two being regarded by the panellists as doubtful, the domain was eliminated. Elimination of this domain proportionally increased the weighting in the remaining domains and, moreover, maintained the differences among them. Thus, the population/end-user domain had a weighting of 36.66%, that of risk/benefit 36.66%, and that of costs/organisation and other implications 26.67%. The domains and definitive prioritisation criteria, together with the weightings received for each domain, are shown below.

Table 2. Prioritisation tool domains and criteria.

Population/end-user domain of prioritisation tool.		1	2	3	4	5	6	7	8	9
Disease frequency	The condition or indication for which the potentially obsolete technology can be used is frequent (high prevalence and/or incidence).									
Disease burden	The condition or indication for which the potentially obsolete technology can be used amounts to a considerable health loss for the patient (mortality, morbidity, disability).									
Frequency of use of technology	The potentially obsolete technology is currently applied to a high number of patients.									
Patient preferences	There is scientific evidence of a lower acceptance by patients of the potentially obsolete technology versus other existing technological alternatives (e.g., greater unpleasantness, greater discomfort, longer treatments).									
Risk/benefit domain of prioritisation tool.		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Efficacy/ Effectiveness/ Validity	The scientific literature indicates that the potentially obsolete technology displays less efficacy or effectiveness than other alternative technologies. If it is a diagnostic technology, the potentially obsolete diagnostic test is less valid (yields more false positives and negatives than other available diagnostic tests).									
Adverse effects	There is evidence in the literature of more adverse or more important effects with the potentially obsolete technology versus other existing technological alternatives.									
Risks	The potentially obsolete technology poses a higher likelihood of health-care staff falling ill or having a work accident (e.g., radiations) or of a greater environmental hazard (e.g., waste) than do other existing technological alternatives.									

Costs domain, organisation and other implications of the prioritisation tool.		1	2	3	4	5	6	7	8	9
Efficiency	There are financial evaluation studies that are more favourable for other existing technological alternatives.									
Maintenance costs	The potentially obsolete technology requires more resources for its functioning (e.g., consumables, reviews, human resources, etc.) versus other existing technological alternatives.									
Other implications	It is foreseeable that withdrawal of the potentially obsolete technology will have a positive impact on the ethical, cultural and/or legal sphere.									

Table 3. Weighting of scale domains

DIMENSION	WEIGHTING
1- Population/end-users	36.66
2- Risk/benefit	36.66
3- Costs, organisation and other implications	26.67
TOTAL (1+2+3)	100 %

3.5. Discussion.

The computer software application developed for prioritisation of potentially obsolete health technologies allows the user to define robustly the technology that meets most requirements for being assessed first. By having a number of criteria grouped in domains, the tool enables each domain's relative importance in the total to be quantified and weighted. The importance of the different domains is similar, since the maximum difference among domain weightings is 10%. The prioritisation application may be used by any centre, institution or person interested in prioritising potentially obsolete health technologies, and could be extrapolatable to other settings similar to Spain.

In the authors' opinion the tool possesses external validity, in that it is applicable to other prioritisation contexts for two fundamental reasons: members of almost all Spanish agencies and technology assessment units participated in drawing it up; and, furthermore, account was taken of the

opinions and weightings of the various parties, such as clinicians, managers/administrators and end-users, who are implicated in assessment of obsolete health technologies and could benefit from their detection and exclusion from the service portfolio. Somewhat surprisingly perhaps, the weightings of each of these groups were not very different, which made it easier for the scale to be finalised in a way that embraced all their opinions. Despite the fact that a higher score would have been expected to be obtained from managers for the costs and organisation section, this did not prove to be the case. Similarly, patients would have been expected to score the risks domain higher, something that, again, did not happen. Although it might be thought that the patients consulted do not represent other patients from other countries or health-care settings (such as the USA), we feel that, insofar as assessment of obsolete technologies is concerned, great differences in patient scores are not to be expected. At all events, the methodology used for selection and assessment of criteria could be a benchmark for their application in specific contexts, if it is thought that these might be very different. A further aspect to be borne in mind would be a case where the assessments are made at a given time and in a given social context, inasmuch as the latter factors might have an influence on the results, or perhaps the importance of the criteria applied and the weightings allocated might vary with the passage of time.

This prioritisation tool also has limitations, one of which is that it has not yet been used under real conditions. Another limitation is that 10 criteria may prove too many when it comes to prioritising obsolete health technologies: if the number of technologies to be prioritised is high, these 10 criteria would have to be covered for each technology, so that the time needed to conclude the prioritisation process could prove extremely long. Furthermore, to be able to score some of the criteria, users of the tool might find themselves faced with the need to consult the literature. It is also true, however, that this workload would be relatively short compared to the length of time required to draw up a report on a potentially obsolete technology. In addition, we feel that the time invested would be more than recouped by making a rigorous prioritisation that took into account all aspects connected with obsolete health technologies. If shorter and less comprehensive prioritisation questionnaires were used, relevant aspects for prioritisation might well be overlooked.

The tool developed is applicable to obsolete health technologies, whether therapeutic or diagnostic, with it being possible for both types of technologies to be prioritised jointly. An effort was also made to ensure that the tool would prove user-friendly through the use of clear wording; and

that it would be highly descriptive, through the generation of figures which made it possible for the assessed technologies to be compared, both overall and in terms of specific aspects. Hence if, say, in any given technology the costs domain had an excessive weight vis-à-vis the other domains, this aspect would be easily identifiable in the tool and so enable the necessary decisions to be taken; and something similar would happen if the risk/benefit domain also had considerable weight in prioritisation for some specific technology.

3.6. Conclusions.

1. Obsolete health technology assessment must be preceded by a rigorous selection process in which technologies having greatest impact on health care are prioritised.

2. A prioritisation tool helps prioritise obsolete health technology rigorously, specifically and transparently, and is potentially exportable to other settings.

3. The prioritisation tool developed includes the views of the different actors involved in obsolete technology assessment, such as managers/administrators, clinicians and patients.

4. The prioritisation process must be transparent and take into account all aspects that influence the impact of an obsolete health technology (population/end-users, risk/benefit, and cost, organisation and other implications). The prioritisation tool developed envisages these aspects and ranks them in accordance with values predefined by a panel of experts.

5. The prioritisation tool developed here enables comparison of the relative importance of aspects that affect population/end-users, risk/benefit, and costs, organisation and other implications in the prioritisation of potentially obsolete technologies.

4. ASSESSMENT OF OBSOLETE HEALTH TECHNOLOGIES.

4.1. Introduction.

Obsolete health technology assessment is a novel aspect of health technology assessment. Accordingly, it is necessary to have a guide that serves as orientation in the drawing-up of reports that appraise such technologies. An obsolete technology report should be characterised, above all, by its brevity and specificity. It is essential that the research question posed is clear, which in this case will be defined by the name of the obsolete technology and its indication where applicable. Similarly, good cause must be shown for recommending the obsolescence of the technology in question, along with any alternative health technology available to patients where this exists.

An obsolete health technology identification and assessment programme should produce documents similar to those issued on new and emerging technologies, albeit with a different seo pe. In new technologies it is important to indicate the precise data source, the amount and quality of the evidence available, along with the expected impact, broken down, if possible, into human resources, financial resources, organisational impact and/or other relevant aspects. In the case of an obsolete technology, it is not quite so important to know the source of the data on the technology (i.e., whence the idea of its obsolescence stems). It is, however, extremely important to know whether there is an alternative that might entail a greater overall benefit for the patient or health-care system, which is in fact the reason for the evaluated technology being obsolete. This conclusion indicates that there is no need to adhere to the classic structure of a health technology assessment report, and a specific structure for this type of assessment can therefore be developed.

This assessment should give a detailed description of the characteristics of the potentially obsolete technology and the alternative technology, as well as the context of application of the potentially obsolete technology (and its diffusion), which indirectly affords insight into the expected impact of its possible withdrawal from the service portfolio.

4.2. Objectives.

To propose and justify a content structure which will serve as a basis for reports (or dossiers) that evaluate potentially obsolete health technologies.

4.3. Methods.

The structure was the result of consensus reached between the working group and technical team, fundamentally in search of succinctness in reports on obsolete technologies. The structure was applied by *avalia-t*, by way of a pilot scheme, to a first obsolete health technology report entitled, "Radiography of the cranium in the diagnosis of cranial or cranioencephalic traumatisms". Subsequently, both Osteba and *avalia-t* applied the same structure to other similar reports.

4.4. Results.

The structure proposed for technical reports on obsolete health technologies is shown below.

Figure 5. Proposed structure for obsolete health technology assessment reports.

1. Information on potentially obsolete technology.
   - — Name of technology.
   - — Type of technology (diagnostic, curative, palliative or rehabilitative).
   - — Year of adoption in health system (approval by competent bodies, if applicable).
   - — Description and indication/s of technology, places where information on the technology can be obtained (if these exist).
2. Contextualisation of potentially obsolete technology.
   - — Incidence and/or prevalence of the disease or condition to which the technology is applied.
   - — Use of the technology. Estimation of the number of patients on whom the technology is being applied.
   - — Diffusion and implementation of the technology (number of centres where it is used, type of centres, national or international scope, etc.).
   - — Setting and necessary infrastructure.
3. Consideration of technology as obsolete.
   - — Justification for the study.
   - — Efficacy/effectiveness results.
   - — Safety results.
   - — Cost and organisation results.
   - — Other aspects to be considered.
4. Level of scientific evidence.
5. Conclusions and recommendations
   - — Efficacy/effectiveness.
   - — Safety.
   - — Costs and organisation.
   - — Other aspects.
6. Data sources and bibliography.

4.4.1. Information on obsolete health technology.

This section will include general information referring to the obsolete health technology, including the technology's name, synonyms and type by reference to the use to which it is put in patients (diagnostic, therapeutic, rehabilitative, etc.). An indication will also be included as to when it was first introduced into the health-care system. In this respect, there may be

technologies on which this information is unavailable, and in such cases the date will be indicated on which knowledge of its first being used in clinical practice was received.

Lastly, in this section, a detailed account will be given of the indication or indications for which the technology's obsolescence is proposed. There may be a given technology that is useful for one indication but is possibly obsolete for others. It is therefore extremely important to specify in detail precisely what is being proposed as an obsolete technology, bearing in mind here that most technologies usually tend to have more than one indication. Supplementing this information, there will be an indication as to where information on the technology can be obtained. This data source may consist of web pages of commercial firms, scientific societies and institutions, or even scientific papers, whether published recently or at some time in the past, which give a detailed description of the characteristics of the technology said to be obsolete.

In some cases, technologies are proposed as being obsolete generically, without specifying any indication, and are therefore deemed obsolete for all indications. This may be the case of imaging tests which emit radiation and for which alternatives are found that possibly emit far less radiation. In such cases, the technology will be proposed as obsolete *per se*, without specifying the indications or indicating the subgroups of patients to which it could be applied.

If the technology has been prioritised vis-à-vis other obsolete technologies, this should also be indicated in this section.

4.4.2. Contextualisation of the technology.

Under this section, indication should be given as to whether the condition or disease to which the technology is applicable is highly prevalent or incident. Furthermore, the report should specify whether the condition generates an elevated disease burden and whether the technology is applied to healthy (e.g., screening tests) or diseased individuals. The ideal would be to obtain such information in a contextualised manner from the setting to which the technology's obsolescence pertains (local, regional or national), and always, where possible, from registries or data sources that afford maximum reliability and are population-based.

It is also necessary to indicate the technology's frequency of use. The condition to which it is applicable may be very frequent in the study area

but the technology may not be applied or hardly used, or the inverse may be true, i.e., a case where the condition is relatively rare and yet the technology is applied in almost all cases, though this second situation is somewhat unforeseeable. To this end, it will be necessary to estimate the number of patients on whom the obsolete technology is being used. In many cases, such estimates will be very difficult to obtain but, by way of a data source, information can be found in the procurement departments of health centres or services, commercial firms, or the clinicians themselves who form part of the specialisation connected with the obsolete technology. The last-mentioned would not only furnish relatively reliable information, but could also provide information on any technologies that might have replaced the obsolete technology, as well as any possible repercussion on their routine clinical practice if the obsolete technology is withdrawn.

The section dealing with diffusion and implementation of obsolete technology will indicate whether the technology is being performed in many centres, whether the centres in which it is used are primary or specialised care centres, and, whether these are specialised, whether they are first-, second- or third-level. Indication will also be given as to whether there is evidence of the technology being used in settings other than national or regional.

Lastly, the section on the setting and infrastructure of the technology should indicate the needs in terms of the equipment, space and human resources required for the obsolete technology's use, something that will also indirectly indicate the possible impact of its withdrawal.

4.4.3. Consideration of technology as obsolete.

This section is the most important part of the report, and included in it will be the available scientific evidence supporting the obsolescence of the assessed technology.

The reason for the assessed technology being obsolete must be clearly explained firstly, stating whether the underlying cause is a loss of effectiveness, a loss of safety, or perhaps excessive organisational costs or aspects relating to its alternatives. Combinations of all three aspects can also be considered. A clear indication must also be given of what the existing alternative technologies are and in which respects these supersede the potentially obsolete technology. These alternatives must have given ample proof of their efficacy/safety/diagnostic capacity and be incorporated into the service portfolio.

There must be a specific section addressing efficacy/effectiveness. This section will list any published studies (original research, systematic reviews or any reliable data source) that may have analysed the efficacy/effectiveness of the alternative technologies vis-à-vis that of the obsolete technology. The results of this section should focus, in particular, on the most robust outcome variables, if any, (mortality, morbidity and quality of life, or sensitivity, specificity and predictive values in the case of diagnostic tests) because, if such outcomes favour the alternative technology, this will reinforce the evidence attesting to the technology's obsolescence. Studies having the highest methodological quality should be highlighted, and the information is to be reported as succinctly as possible. It is in this section that the treatment standards for the indications of the potentially obsolete technology being considered are to be specified in accordance with clinical practice guidelines, HTA reports or high quality systematic reviews, if any.

The following section is to address the safety of the obsolete technology versus the safety of alternative technologies. As in the preceding section, this section should be brief and should focus on the general results of studies and, in particular, on easily measurable and objective variables.

The costs and organisation results section will provide information detailing which organisational or cost-related aspects are reported by the literature as placing the obsolete technology at a disadvantage vis-à-vis the alternative technology. Information received from commercial firms or furnished by clinicians can be included in this section. In these cases, care must be taken with regard to any possible existing conflicts of interest, and the source of all data obtained must be clearly shown.

There will be a final section headed, "Other aspects to be considered", which can be covered for any technology requiring this. Here, other relevant aspects of the assessed technology can be commented upon, i.e., ethical, legal or social aspects that might be of importance for some obsolete technologies.

4.4.4. Level of scientific evidence.

This section will summarise the quality of the evidence available for classifying or not classifying the technology as obsolete. A number of already published scales can be used. The use of the scale of the *Scottish Intercollegiate Guidelines Network* (SIGN) (33) or that of the Oxford Centre for Evidence-Based Medicine Levels of Evidence (34) is recommended.

4.4.5. Conclusions and recommendations.

The Conclusions section will succinctly sum up the conclusions of each of the preceding sections. The conclusions may themselves be accompanied by recommendations and proposals about the obsolete technology.

4.4.6. Data sources and bibliography.

The databases consulted and the search strategies used for making the report will appear in this last section. This section must record the rules governing systematic reviews, which, in essence, require that the method applied be reproducible. The systematic review is the methodology that should follow all assessments of potentially obsolete technologies.

4.5. Discussion.

Obsolete health technology assessment documents ought to have a certain structure. It would be ideal if all the bodies and agencies interested in assessing obsolete technologies used a similar structure because then the reports would be more easily interchangeable among the HTA agencies and units, and could go to form a possible common database on these types of technologies.

The proposed structure is innovative in the sense that, on the method being featured at the end of the document, it might appear to forfeit a certain degree of importance. This is not so, however, since the search for evidence on the lack of effectiveness or lower safety of an obsolete technology must be systematic and have the same robustness as if it were an assessment of a new technology. It was decided to move it to the end, so that readers could directly proceed to analyse the factors that determine the technology's obsolescence, which is really the reason for their interest in the document. The section defining the technology as obsolete assumes great importance: it is the very core of the report, where the reasons for which the assessed technology is deemed obsolete must be made crystal clear.

One aspect to be highlighted is the inclusion of the level of evidence of the literature available, something that lends the report's conclusions and recommendations greater robustness when it comes to deciding whether there is evidence of sufficient quality for classifying the technology assessed as obsolete. For this purpose existing standards will be taken into account.

Rather than being lengthy, the proposed report should be brief and to the point, striving to be on a parallel with emerging health technology iden-

tification systems, and should be of use to managers and clinicians. These types of reports on obsolete technologies should be regularly drawn up, as just another routine task of health technology assessment agencies. Such agency reports could go to feed a common database, shared by all agencies, with links to the complete documents on the obsolete technologies in a manner akin to that of the GENTecS platform for assessment of new health technologies. Reports should also be disseminated to parties involved in the use or funding of obsolete technologies.

4.6. Conclusions.

1. Assessment reports on any potentially obsolete health technology must implicitly entail a systematic review.

2. A common structure for obsolete health technology reports will enable the various bodies interested in drafting such reports to do so in a standard manner.

3. The proposed structure enables a report to focus on the obsolete health technology in question and concisely compare it to its alternatives.

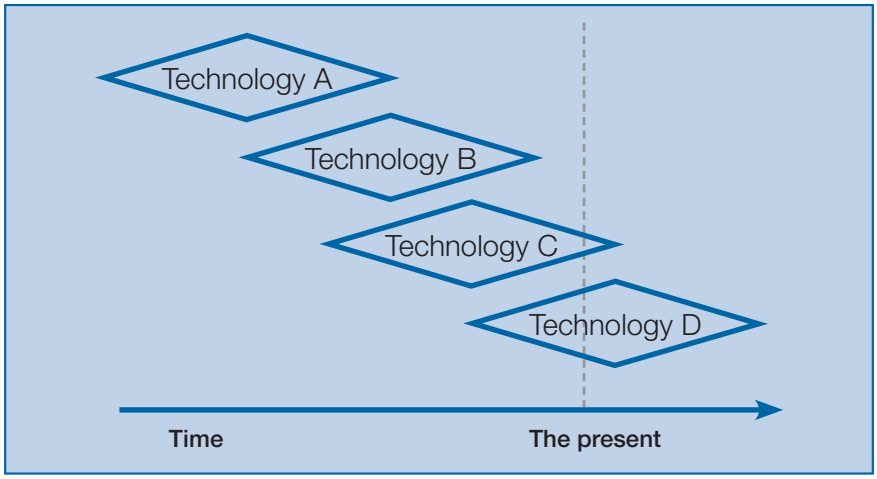
4. Citing the level of evidence that underpins the conclusions and recommendations provides health authorities with one more decision-making element in respect of the decisions to be taken with respect to the technology assessed.

5. GENERAL COMMENTS AND GUIDELINE LIMITATIONS.

This guide seeks to cover a methodological gap in health technology assessment. Until now there has been no rigorous approach to assessment of potentially obsolete health technologies, despite the fact that its relevance has been acknowledged in health organisations.

A very important aspect which should not be overlooked when evaluating a potentially obsolete health technology is that the medical bibliography usually only considers the potential benefits of a new versus a standard technology (whether or not obsolete). This is logical, since it is always the view that new technologies ought to surpass and supersede the best alternative available or, at least, the standard technique (principle of beneficence), and the magnitude of this improvement is examined. Yet, it is also true that this implies that the technology already in place would show a loss of benefit compared with the new technology. This is the aspect which must be considered when evaluating obsolete technologies. An added problem is that technologies used for comparison often vary over time, something that might occasionally render assessment of the results of an obsolete technology versus the current treatment standard very difficult, since there may be few studies that compare these directly.

Figure 6. **Example of use of different technologies for a single indication.**



Hypothetical example showing 4 technologies which have been used for the same indication. The width of each diamond indicates the respective technology's degree of use. The dotted line represents the use of these technologies at the present time. Technologies A and B would be obsolete and C would be indicated in very specific cases.

Indeed, as pointed out by Pearson and Littlejohns (12), the principal problem for assessing an obsolete technology is the dearth of data, and these authors also note that there is no technology that does not at least enjoy limited -but all the same, enthusiastic- support. Accordingly, this calls for a very rigorous approach to the evidence (based on robust data from sound studies) for taking any decision which entails reducing or eliminating the funding of certain technologies.

Another important point is that this guide does not formally address the financial aspects linked to obsolete technologies. Despite the fact of there being a costs and organisation section in the proposed report model, it is not the aim of this guide to conduct a comprehensive analysis of the possible financial or organisational repercussions of an obsolete technology's withdrawal. Although we acknowledge that this topic is important, *the essential element that should determine the withdrawal of funding from any obsolete technology is its lack of effectiveness or safety*. At all events, it would be extremely interesting if reports on obsolete technologies were to incorporate a somewhat more detailed section on their financial repercussions, though another solution would be for this type of analysis to be performed for specific obsolete technologies or obsolete technologies which are as effective and safe as current ones but more expensive in financial or organisational terms.

The financial aspect of obsolete technology assessment is an open field and one that ought to be developed in the near future. Institutions such as the NICE have cost-effectiveness thresholds for new versus already established technologies (11) and perhaps these thresholds could also be used for the characterisation of certain technologies as obsolete, though there may be other factors that influence health technology obsolescence to a greater degree. For instance, Buxton has indicated the need to know the cost-effectiveness of technologies which should be phased out by the NICE in the near future, and that this institution should locate cost-ineffective technologies in order to recommend disinvestment from them. He also makes the point that this need is particularly important when the National Health Service is emerging from a period of 7 years of budgetary strength and is going through a lean period (NOTE: when the author wrote the above, the current world financial crisis had not yet begun). He notes that the NHS must assimilate the idea of active disinvestment from cost-ineffective activities. In conclusion, it would perhaps be interesting to draw up a series of criteria defining when financial assessment of potentially obsolete health technologies is called for, since this will not always be necessary; and it would likewise be interesting to draw up a brief methodological guide that would indicate how this type of assessment was to be made. Elshaug et al have

also recently proposed prioritisation criteria for more detailed assessment targeted at disinvestment from health technologies (35), while the GuNFT guideline, drawn up by Osteba, proposes criteria for undertaking this process in an organised, systematic fashion (31).

It is evident that the detection of an obsolete health technology is closely related to the time that has elapsed since it was introduced into clinical practice, as can be seen in Figure 7. The more time that has elapsed since its introduction, the greater the likelihood of the technology being obsolete. Nevertheless, this type of technology is bound to have been displaced by another more efficient technology, and it is more than likely that it is no longer used. Detection and assessment of such technologies would be a process that would consume agency resources and, in return, afford little benefit.

Presumably, the true objective of an obsolete health technology characterization are those technologies which are currently being used in clinical practice and which may even have been introduced into health-care system just a few years previously. Detection and exclusion of such technologies would be expected to have a great impact on the health-care system and make way for a major reallocation of resources (a reinvestment taken in positive terms). Notwithstanding this, detection of these types of technologies is complex owing to a number of factors. In the first place, if they have been applied for only a short time, it is possible that few studies may have been published and, though the evidence might point to their having a diminished effect, this would not be enough to recommend their exclusion. Furthermore, any studies which have been published since the new technology was introduced and which assess other technologies are bound to have used earlier comparators to enhance the effect of the new technology, thus again rendering comparison complex. At all events, agencies would have to identify potentially obsolete technologies for prioritisation and assessment purposes, making every effort to ensure that these were relevant in terms of the potential impact (including, logically, impact on patients) to be generated by their withdrawal from health organisations.

Figure 7. Impact of withdrawal of obsolete health technologies according to time elapsed since their application in clinical practice (in-house).

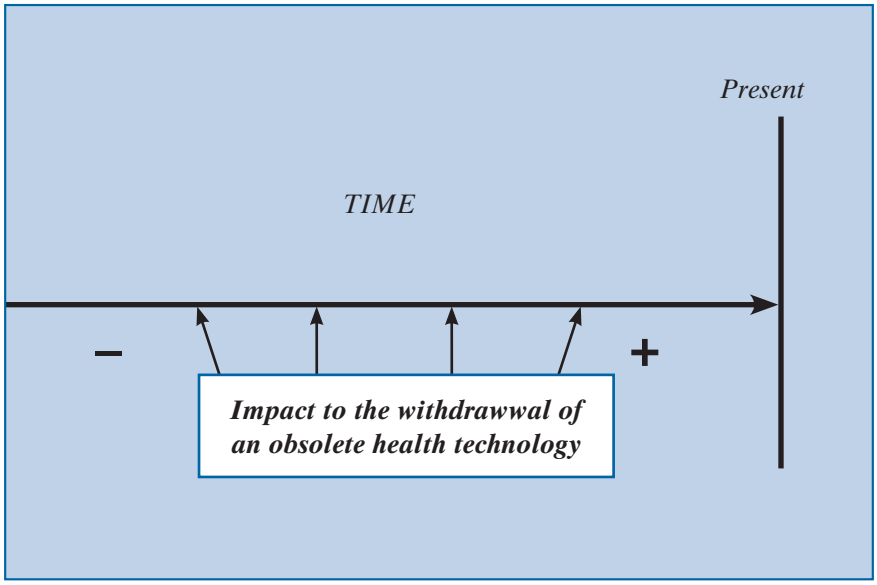
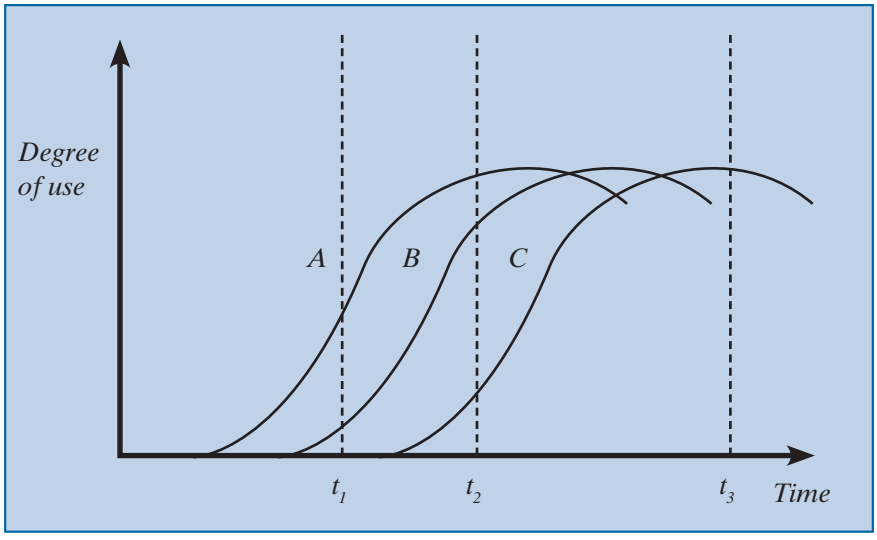


Figure 8. Diagram of the life of health technologies and points in time in the assessment of their obsolescence (in-house).



In the above figure, a number of situations show the obsolescence of different technologies to be assessed. A, B and C are different technologies for treating the same condition, which have arisen at different moments in time. Assuming that the newest technologies are better than their predecessors in terms of efficacy and safety, it can be deduced that, at point in time, t_2, A and B would be obsolete with respect to C, and an important benefit would be obtained if they were withdrawn from clinical practice. Technology A has already reached a plateau and B is about to level off and reach its plateau. At point in time, t1, assessment of the technologies would show that A was obsolete with respect to B, though it would perhaps be premature for A to be withdrawn because there are still aspects of B to be clarified, since this latter technology was introduced into clinical practice a very short time previously. The most unfavourable point in time for assessing technologies A and B as potentially obsolete would be t_3, since it is clear that both have fallen into disuse and are no longer relied upon, so that the benefit of classifying them as definitely obsolete would be negligible.

Just as there is a systematic procedure in Spain and in autonomous regions such as Galicia for introducing health technologies and updating the service portfolio, it would be of interest if the foreseeable withdrawal of health technologies that became obsolete as they were displaced by technologies being introduced into clinical practice, could be planned in the same way. For instance, the introduction of Positron Emission Tomography-Computerised Tomography (PET-CT) for evaluation of solitary pulmonary nodules will progressively displace the use of CT on an individual basis, and the use of this latter technology in the detection of pulmonary nodules will then grow obsolete as PET-CT becomes increasingly available in hospitals.

Another aspect that warrants discussion is the unpopularity of defining certain technologies as obsolete. There may be manufacturers who are not in agreement with the classification of their products as obsolete, and health decision-making may also become reticent, since there is the danger that disinvestment may be made from services in which there is no strong leadership rather than from those which are genuinely less safe or effective (11). As a NICE document indicates, "there will be many clinicians and perhaps groups of persons that prefer the status quo, regardless what the evidence may say", thereby underscoring the fact that a crucial aspect for preparing the ground will be communication with the different groups to prepare them for disinvestment. A further problem could be that, despite there being more effective technologies, these cannot be implemented for resource-related or organisational problems, as has happened in some health systems on cobalt

pumps being gradually replaced by linear accelerators for radiotherapy treatments.

Within the context of obsolete technology data sources, searching scientific literature proves complex and depends on the search terms used. Time is required in selecting the information, and the type of information varies depending on its origin and the type of publication. For the introduction of health technologies, the clinical trial is the benchmark research study. Nonetheless, this type of study sometimes responds to a complex methodological design and calls for major financial investment. Clinical trials which involve a potentially obsolete technology are all but non-existent, unless the technology to which this is being compared has recently come onto the market. Withdrawal of medications or suspension of marketing and sale can be simpler than the withdrawal of a given health technology, since in general the studies available are more robust (they are almost always clinical trials) and the medications are indicated for very specific conditions. This does not mean to say, however, that similar regulatory mechanisms may not have to be implemented for obsolete or ineffective health technologies.

Moreover, detection and classification of a health technology as obsolete would be incomplete if this information were not transferred to clinical practice to ensure that patient health was protected and health care ultimately improved. Such obsolete technologies ought to be excluded from clinical practice by a statutory procedure which provides for this, and so be in a position to benefit from the legal coverage offered by the Spanish legislation in force (30).

6. CONCLUSIONS AND RECOMMENDATIONS.

1. Location of potentially obsolete health technologies is complex. Current search systems in the most widely used medical literature databases are not geared to detection of these types of technologies.

2. There are very useful data sources for detecting potentially obsolete technologies. These data sources are databases containing: health technology assessment reports; new and emerging technologies; obsolete health technology detection networks; and currently prevailing statutory rules and regulations. Once a foreseeable obsolete technology has been detected, a standardised procedure must be established to assess whether it meets the criteria that would define it as a potentially obsolete technology, before being passed through to the prioritisation stage for eventual assessment.

3. The existence of a prioritisation tool facilitates the selection of potentially obsolete technologies entailing a greater impact on health care processes or patient safety. A prioritisation system such as that developed in this report enables potentially obsolete technologies to be prioritised, taking into account the points of view of the different actors in the health-care system (administrators/managers, clinicians and end-users).

4. Having this tool (PriTec tool) in Spanish and English will make it possible for prioritisation criteria to be unified, and comparisons among different health organisations to be drawn. It is possible that the tool developed may need to be adapted to other health settings or contexts.

5. A recommendation for a given health technology or indication to be classified as obsolete must be based on scientific evidence and conclude with a recommendation for its exclusion from the service portfolio, or clearly and exclusively confine the technology's use to some well-delimited clinical situations.

6. The definition of a content structure for obsolete health technology assessment documents renders such a document easier to draft and to read. On this being a novel proposal, it would be of great interest if it

were used by all organisations involved in the evaluation of obsolete technologies so as to have a document with a standard structure for health technology assessment.

7. The greatest challenge in the assessment of potentially obsolete health technologies is the detection, prioritisation and assessment of technologies which genuinely imply an important impact for health care systems. This is the main objective of this aspect of HTA and the most difficult goal to achieve. It is of little use to appraise and confirm health technologies as obsolete if these are hardly used in clinical practice.

8. Knowledge on the part of clinicians, managers and end-users of the health-care system of the existence of obsolete health technologies and the dissemination of reports that assess such technologies are crucial for achieving the necessary impact for this type of assessments.

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APPENDIX

APPENDIX I. Bibliographic search

As stated above, a search was made of a number of computerised databases, targeted at locating information published on any facet linked to obsolete health technologies. The search strategy pursued is shown below.

The search was conducted from 1990 to January 2008 in the following bibliographic databases, with periodic updates thereafter.

- Health technology assessment agency databases:
  - — INAHTA (International Network of Agencies for Health Technology Assessment);
  - — International health technology assessment agencies; and,
  - — National health technology assessment agencies.
- Specialised systematic review databases:
  - — Cochrane Library Plus; and,
  - — CRD databases.
- General databases:
  - — Medline (Pubmed); and,
  - — Embase (Elsevier).
- General search engines:
  - — *Google académico* (Google Scholar); and,
  - — Altavista.

The search strategy included, among other things, the terms "obsol*", "declutter*", "health apprais*", "disinvest*", "out of date", "out of model", "ineffective AND technology", "disused AND procedure AND technology AND procedure AND device" (the search strategies used in each of the databases are shown at the end of this section).

The search was periodically updated, with the latest update being on 25 March 2009.

Search results were processed by a bibliographic-reference software management tool (EndNote) to eliminate duplicates. After reading the Abstracts of the papers yielded by the search, studies were selected by two re-

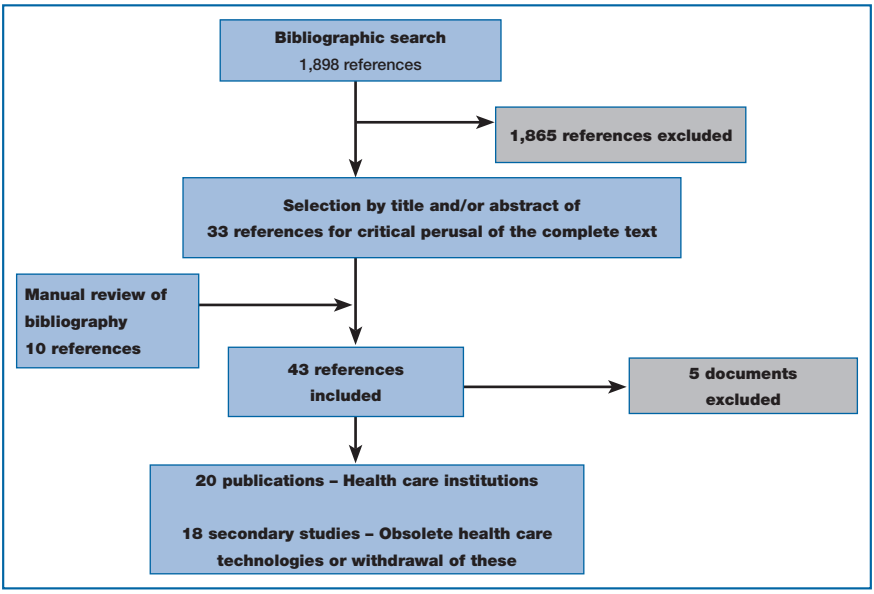
searchers, working separately, for perusal of the complete text. Subsequently, the references cited in these studies were reviewed manually.

This entire process was completed by conducting a general search on the Internet (of organisations, scientific societies, etc.), in order to seek other information of interest.

Additionally, information on the project content was forwarded to the INAHTA distribution list. The INAHTA was informed of the commencement of the project and was asked whether any agency was currently working or had worked on a project connected with obsolete technologies, related definitions, obsolete technology prioritisation criteria, and reports issued on obsolete techniques or procedures.

The results of the bibliographic search are described below:

After duplicates had been eliminated, the primary bibliographic search of the biomedical literature databases yielded a total of 1,898 bibliographic references. After reading the Abstracts, 33 documents were selected for perusal of the complete text. Following a manual review of the latter, 10 new documents were included, with a total result of 43 references. Finally, the content of 38 documents was analysed by *avalia-t* technical staff, in order to weigh up their contribution to the methodological guide.



Flow chart of search results..

The types of documents located fundamentally consisted of proposals of health institutions or national health programmes concerning obsolete technologies, health-care disinvestment or optimisation of health resources.

With respect to publications that addressed or expressed an opinion on the obsolescence of specific health technologies, we obtained expert opinions, briefings and informative studies on obsolete technologies, with or without comparative technology.

After contacting assessment agencies belonging to the INAHTA, we received reports on different initiatives connected with obsolete health technologies or disinvestment in Australia, Canada and Israel. The DACEHTA (*Danish Centre for Evaluation and Health Technology Assessment*) provided us with an Abstract of an unfinished report on an obsolete technology. In all cases, the information furnished consisted of proposals or opinions about obsolete technologies, but without any specific result.

The information obtained from different health institutions is shown in the Introduction to the guide.

Search strategy.

Using a specific search strategy, the bibliographic review was conducted in January 2008 in the following databases:

SPECIFIC HEALTH TECHNOLOGY ASSESSMENT DATABASES AND WEB PAGES:

INAHTA, and Spanish (AETS, ISCIII, AETSA, Osteba, UETS) and international health technology assessment agencies (CEDIT, MTU/SFOPH, ICTACH, DACEHTA, IAHS, NHSC, DAHTA-DIMDI, CADTHA, CENETEC, AHTA, NZHTA): health technology assessment reports were retrieved from them.

#1. obsolete AND technology
#2. obsolescence AND technology
#3. obsolescent AND technology
#4. "out of date" AND technology
#5. "out of model" AND technology
#6. obsolescent AND device

#7. obsolescent AND procedure
#8. obsolete AND device
#9. obsolete AND procedure
#10. disinvestment
#11. ineffective AND technology
#13. ineffective AND device
#14. disused AND technology
#15. disused AND procedure
#16. disused AND device

GENERAL DATABASES:

1. The strategy used in these databases, Medline and Embase was the same, and is outlined below

MEDLINE (PUBMED)

#1. "Technology Assessment, Biomedical"[Mesh] OR technol*[TITL] OR assess*[TITL] OR health technol*[TITL] OR health apprais*[TITL] OR HTA[TITL] OR procedure*[TITL] OR device[TITL] OR "diagnostic test"[TITL]
#2. old*[TITL] OR out of date[TITL] OR obsol*[TITL] OR expire*[TITL] OR ineffective*[TITL] OR withdraw*[TITL] OR declutter*[TITL]
#3. #1 AND#2
#4. disinvest*[TIAB]
#5. #3 OR #4
Results were limited to the following criteria:
Languages: English, French, Italian, Portuguese, Spanish
1990-the present
Comments, letters and editorials were excluded

EMBASE (Elsevier)

#1. obsol*:ti OR 'out of date':ti OR expir*:ti OR ineffect*:ti OR disuse*:ti OR old*:ti OR withdraw*:ti OR declutter*:ti
#2. 'biomedical technology assessment':ti OR technol*:ti OR apprais*:ti OR assess*:ti OR hta:ti OR device*:ti OR procedure*:ti OR 'health technol':ti OR 'health apprais' OR 'diagnostic test':ti
#3. #1 AND #2
#4. disinvest*:ti,ab
#5. #3 OR #4
Results were limited to the following criteria:
Languages: English, French, Italian, Portuguese, Spanish

1990-the present
Comments, letters and editorials were excluded

General search engines: in addition, we collected general information that was located by means of general search engines, such as Google Scholar.

Google Scholar:

#1. allintitle: disinvestment AND health
#2. allintitle: disinvestment AND technology
#3. allintitle: obsolescent AND health
#4. allintitle: obsolete AND health
#5. allintitle: obsolete AND technology
#6. allintitle: expired AND health AND technology
#7. allintitle: disuse AND health AND technology
#8. allintitle: ineffective AND health AND technology
#9. allintitle: ineffective AND health AND device
#10. allintitle: ineffective AND health AND procedure
#11. allintitle: ineffective AND health AND assessment
#12. allintitle: ineffective AND health AND resources
#13. allintitle: disuse AND health AND resource

APPENDIX II. List of panellists in prioritisation of obsolete technologies

1. Alfonso, Santiago

System end-user - Patient associations
Acció Psoriasis

2. Alfonso Sánchez-Sicilia, Ana

Manager/administrator (hospital)
Fuenlabrada Hospital

3. Argimón Pallas, Josep María

Manager/administrator (hospital)
Catalonian Health Service

4. Blanco Ramos, Manuel Ángel

Manager/administrator (primary care)
Ourense Primary Care Authority

5. Begiristain Aranzasti, José María

Manager/administrator (Central Services Authority)
Basque Government Department of Health

6. Coloma, Herminia

System end-user - Patient associations
Catalonian Transplant Patients Sports Association (Associació Esportiva Catalunya de Trasplantats - AECAT)

7. Dazinger Cazenave, Susan

System end-user - Patient associations
Tenerife Patients Association

8. del Molino, Juana María

System end-user - Patient associations
Acció Psoriasis

9. de Sancho Martín, José Luis

Manager/administrator (hospital)
Vall d'Hebron University Teaching Hospital

10. Fernández Villar, Alberto

Clinician (specialised care)
Cíes General Hospital – Vigo University Teaching Hospital Complex

11. García Bravo, Agustín Miguel

Clinician (specialised care)
Nuestra Señora de la Candelaria University Teaching Hospital, Tenerife

12. García Comesaña, Julio

Manager/administrator (hospital)
Hospital do Meixoeiro – Vigo University Teaching Hospital Complex

13. García Rodríguez, Juan Rafael

Manager/administrator (hospital)
Island of Gran Canaria University Teaching-Maternity Hospital

14. Garmilla Iglesias, Ignacio Javier

Clinician (specialised care)
Txagorritxu Hospital

15. Gómez Sancha, Fernando

Clinician (specialised care)
Advanced Urological Surgery Institute. Madrid

16. Grau Cano, Jaume

Manager/administrator (hospital)
Barcelona Clinical Hospital

17. Jaime Soler, Fernando

System end-user - Patient associations
Inmunitas Vera

18. Julián Ibáñez, Juan Francisco

Clinician (specialised care)
Germans Trias i Pujol Hospital

19. Lisón Roca, Contxita

System end-user - Patient associations
Catalonian Pacemaker Patients Association (Portadors de Vàlvules Cardíaques de Catalunya - POVACC)

20. López García, María Luisa

Manager/administrator (Central Services)
Regional Health Authority. Galician Regional Authority

21. Martínez Alday, Nerea

Clinician (specialised care)
Cruces Hospital

22. Martínez León, Nuria

Clinician (primary care)
Catalonian Health Institute

23. Mosquera Osés, Joaquín José

Clinician (specialised care)
Corunna (A Coruña) University Teaching Hospital Complex

24. Mosquera Álvarez, Rocío

Manager/administrator (hospital)
Nuestra Señora de la Esperanza Hospital

25. Pérez de Arriba Díaz de Argandoña, Joseba

Manager/administrator (Central Services Authority)
Health Department. Basque Government.

26. Puig Sardá, Susana

Clinician (specialised care)
Barcelona Clinical Hospital

27. Serena Puig, Andrés

Clinician (specialised care)
Meixoeiro Hospital – Vigo University Teaching Hospital Complex

28. Soria López, Adela

Clinician (specialised care)
Island of Gran Canaria University Teaching Hospital

29. Veiras Candal, Camilo

Manager/administrator (hospital)
"José Antonio Quiroga y Piñeyro" Galician Oncological Centre Foundation

P.V.P.: 10 euros