# Scanning the horizon of obsolete technologies: Possible sources for their identification

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**Objectives**: The aim of this study was to identify and rank the sources for the detection of potentially obsolete technologies (POTs).
**Methods:** A specific questionnaire related to the search strategies and sources used for the identification of POTs and also for ineffective, inefficient or harmful health technologies was sent to the Health Technology Assessment International's Information Resources Group (HTAi-IRG) group. With the obtained information and taking into account the sources used for the identification of new and emerging technologies, a second questionnaire was elaborated and sent to EuroScan and International Network of Agencies for Health Technology Assessment (INAHTA) members, who had to select and score them. For the final ranking, the number of votes and the median score were taken into account.
**Results:** Seven HTAi-IRG members answered to the first questionnaire. Seventeen agencies answered to the second one (thirteen EuroScan members and four more members from INAHTA), but only seven had worked in the identification of POTs and one of them using only experts for it. The remaining six agencies answered the part related to devices, diagnostics, and procedures; five of them did it for settings and programmes and only three for drugs. The Canadian Agency for Drugs and Technologies in Health (5 votes; median = 2), Cochrane Collaboration (5 votes; median = 3), NICE (4 votes; median = 1), Food and Drug Administration (4 votes; median = 1.5), and EuroScan (4 votes, median = 2) were the most relevant sources for devices and diagnostics.
**Conclusions:** There is little experience on POTs identification. The identified sources provide mostly indirect information and further research should take place to determine the best use of them.

**Keywords:** Obsolete technology, Health technology assessment, Identification sources

Healthcare systems and organizations have the responsibility to decide which services will be incorporated into national health systems, determining the limits of their funding (12). In recent years, healthcare systems have been overwhelmed by a continuous increase of new health technologies; in 1994,

Banta and Gelijns (1) found it necessary to develop a systematic approach to identify and select the most important appeared new and emerging technologies, evaluating them and communicating the obtained information to the decision makers, providing them more time for considering the future introduction of those technologies into the healthcare systems (9). The set of steps described by Banta and Gelijns (1) is known as a horizon scanning system (HSS), a system that is generally part of or is connected to health technology assessment (HTA) agencies. To identify new and emerging health technologies, most HSSs use a combination of resources, ranging from the Internet to clinical experts and the industry

(4). With regard to the Internet, there are several published documents that define the sources that may be used for this purpose (3;4).

In addition, as well as the effective introduction of new technologies in the health care system, disinvestment processes on obsolete or ineffective health technologies could also help to ensure the sustainability of the health care system, providing new resources that could be reinvested in more effective, cost-effective, or useful health technologies. This is an area that has not been thoroughly developed: what is more, there is a lack of a reliable administrative mechanism for identifying and prioritizing healthcare technologies and/or practices with doubtful clinical or cost-effectiveness (5), although according to a recent qualitative study, the development of a model similar to that which is already in use for new and emerging health technologies would be helpful (6).

In 2008, a Spanish group started working on a project related to "the identification, prioritization and evaluation of potentially obsolete health technologies" (POTs), defined as "those healthcare technologies or its application in a concrete indication whose clinical benefit, safety, or cost-effectiveness has been superseded in a significant way by other available alternatives" (unpublished data, 2009). Due to the lack of previous research into the Internet resources and the search strategies that could be used to identify POTs, it was considered to carry out an initial research in this area.

The aim of the present work is to explore the international experience related to the possible strategies and sources that agencies have used to identify POTs and to prioritize these resources according to the type of technology identified.

## MATERIALS AND METHODS

### Exploring the International Experience in the Area

At the beginning of the study, an e-mail contact was made with those agencies that could be working in areas related to the identification or evaluation of POTs. Due to the limited international experience found and the absence of any standardized process for POTs identification, a questionnaire related to this area was sent to the Health Technology Assessment International's Information Resources Group (HTAi-IRG) to explore their experience on it. The questionnaire had two sections: in the first one, experts were asked about the search strategies they had used to identify obsolete technologies, as well as those strategies used for identifying ineffective, inefficient or harmful technologies. This last question was included in this questionnaire because we also wanted to explore what happened with those technologies that are included in the only international definition we could find related to obsolete technologies, which is more related to those technologies where funding could be removed ("Obsolete/outmoded/abandoned: superseded by other technologies

or demonstrated to be ineffective or harmful") (7). The second part of this questionnaire was related to the information sources that experts had used to this end.

### Selection and Prioritization of the Information Sources for POTs Identification

To elaborate the second questionnaire, with the aim of selecting and prioritizing the sources to use in the identification of POTs, due to the existing relationship between new and obsolete health technologies the list of sources that was obtained by Douw et al. (4) to identify new and emerging technologies was considered. This list was slightly modified according to the answers received from the HTAi-IRG group. Furthermore, those sources that did not return any results when search terms related to obsolescence or ineffectiveness were entered, were also excluded.

The second questionnaire presents and classifies a series of resources that might be used to identify POTs into the following areas: (i) HTA organizations and related databases; (ii) Early assessment and alert systems; (iii) Health organizations; (iv) Related organizations; (v) Marketing authorization agencies; (vi) News sites; (vii) Societies; and (viii) Journals. This questionnaire was sent to all members of EuroScan and INAHTA, who had to select the sources that they had used to identify each type of technology, giving them a score from 1 to 9 (from higher to lower importance). The sources were graded independently for each type of technology (device, diagnostics, drug, procedure, program, and setting), taking into account both the number of votes and the obtained median score.

## RESULTS

### Exploring the International Experience in the Area

Responses from Australia, Canada, Germany, Israel, and the United Kingdom were received to the e-mail contact made with the agencies that could be working in this area, demonstrating that, although there is a lack of experience in this area, projects and initiatives related to disinvestment processes, distribution of the information about ineffective or harmful technologies and commissioning guides were being carried out.

With regard to the sources and strategies to be used to identify POTs and ineffective, harmful, cost-effective or inefficient technologies, only seven HTAi-IRG members replied or sent comments about them (7 of 65). None of the agencies who answered to the questionnaire had used a search strategy to identify obsolete technologies, as defined by the Spanish group, although two had used strategies for identifying ineffective, harmful, cost-effective or inefficient technologies and specified the databases in which the searches had been carried out (Table 1). Two agencies suggested some sources

**Table 1.** Strategies and Sources for Identifying Ineffective, Harmful, Cost-Ineffective, or Inefficient Technologies

|  | Which search strategy? | In which databases? |
|---|---|---|
| Agency 1 | Technologies removed for public funding for such reasons (ineffective, harmful, cost-ineffective, or inefficient technologies) | National databases, Health Ministry sites with details on national health policy decision making, for instance in NZ, Australia, and Canada |
| Agency 2 | "Disinvestment," "disinvest," cost-saving/efficiency, organizational/resource allocation (very extensive information)/clinically ineffective services | NICE, Australian National Bibliographic Database, The Library of Congress, and the OCLC World catalog |

NZ, New Zealand; NICE, Natonal Institute for Health and Clinical Excellence; OCLC, Online Computer Library Center, Inc.

**Table 2.** Sources for the Identification of Potentially Obsolete Devices

| Devices | Source | Votes (Max 6) | Median |
|---|---|---|---|
| HTA Organizations | Canadian Agency for Drugs and Technologies in Health | 5 | 2 |
|  | The Cochrane Collaboration | 5 | 3 |
|  | National Institute for Health and Clinical Excellence (NICE) | 4 | 1 |
|  | Agency for Healthcare Research and Quality | 4 | 3 |
|  | INAHTA | 3 | 1 |
|  | Centre for Reviews & Dissemination (CRD) | 3 | 1 |
|  | ASERNIP-S | 3 | 1 |
|  | New Zealand Health Technology Assessment publications | 3 | 2 |
|  | Institute of Health Economics | 3 | 3 |
|  | Swedish Council on Technology Assessment in Health Care | 3 | 4 |
| Early Assessment & Alert Systems | EuroScan | 4 | 2 |
|  | Australia and New Zealand Horizon Scanning Network | 3 | 3 |
| Health Organizations | NHS National Library for Health | 3 | 5 |
| Related organizations | ECRI Institute | 3 | 2 |
| Marketing authorizations | U.S. Food and Drug administration (FDA) | 4 | 1.5 |
| Journals | JAMA | 3 | 3 |
|  | British Medical Journal | 3 | 5 |

INAHTA, International Network of Agencies for Health Technology Assessment; ASERNIP-S, Australian Safety and Efficacy Register of New Interventional Procedures – Surgical; NHS, National Health Service; ECRI, Emergency Care Research Institute; JAMA, Journal of the American Medical Association.

that could be used to this end, such as the Cochrane Library/EPOC database, HTA database, Horizon Scanning Organizations, the UK's National Prescribing Centre, the TRIP database, Medscape, and Guideline organizations.

## Selection and Prioritization of Sources

Of the 17 agencies that answered to the questionnaire about the possible sources for POTs identification, only seven selected and scored the possible sources to be used. These agencies were the following: Osteba, HAS, MUMM, IHE, ASERNIPs, SBU, and NHS Scotland, four of which are members of the EuroScan network.

One of the agencies that had worked in this area used only direct contact with healthcare professionals to identify POTs. Of the six remaining agencies, two identified all types of technologies except drugs; one identified devices, diagnos-

tics, and procedures and the three remaining ones, all types of technology. Therefore, six agencies answered for devices, diagnostics and procedures, five for settings and programs, and three for drugs. The ranking of the selected sources, with the number of votes and the obtained median score are presented in Tables 2–6.

## DISCUSSION

The present study explores the usefulness of a variety of sources for the identification of POTs. As it was found in the literature, this process has not been systematized. The small number of papers found related to this area emphasized the role played by expert opinion in the process of health technology disinvestment, which is without doubt a newly emerging domain (6). The present work, therefore, had a starting

**Table 3.** Sources for the Identification of Potentially Obsolete Diagnostics

| Diagnostics | Source | Votes (Max 6) | Median |
|---|---|---|---|
| HTA Organizations | Canadian Agency for Drugs and Technologies in Health | 5 | 2 |
| | The Cochrane Collaboration | 5 | 3 |
| | National Institute for Health and Clinical Excellence (NICE) | 4 | 1 |
| | Agency for Healthcare Research and Quality | 4 | 2.5 |
| | INAHTA | 3 | 1 |
| | Centre for Reviews & Dissemination (CRD) | 3 | 1 |
| | ASERNIP-S | 3 | 1 |
| | New Zealand Health Technology Assessment publications | 3 | 2 |
| | Institute of Health Economics | 3 | 2 |
| | Swedish Council on Technology Assessment in Health Care | 3 | 4 |
| Early Assessment & Alert Systems | EuroScan | 4 | 2 |
| | Australia and New Zealand Horizon Scanning Network | 3 | 3 |
| Health Organizations | NHS National Library for Health | 3 | 5 |
| Related organizations | ECRI Institute | 3 | 2 |
| Marketing authorizations | U.S. Food and Drug administration (FDA) | 4 | 1.5 |
| Journals | JAMA | 3 | 3 |
| | British Medical Journal | 3 | 5 |

INAHTA, International Network of Agencies for Health Technology Assessment; ASERNIP-S, Australian Safety and Efficacy Register of New Interventional Procedures – Surgical; NHS, National Health Service; ECRI, Emergency Care Research Institute; JAMA, Journal of the American Medical Association.

**Table 4.** Sources for the Identification of Potentially Obsolete Programmes

| Programmes | Source | Votes (Max 5) | Median |
|---|---|---|---|
| HTA Organizations | Canadian Agency for Drugs and Technologies in Health | 4 | 1.5 |
| | The Cochrane Collaboration | 4 | 2.5 |
| | National Institute for Health and Clinical Excellence (NICE) | 3 | 1 |
| | INAHTA | 3 | 1 |
| | Centre for Reviews & Dissemination (CRD) | 3 | 1 |
| | Agency for Healthcare Research and Quality | 3 | 1 |
| | New Zealand Health Technology Assessment publications | 3 | 2 |
| | Institute of Health Economics | 3 | 2 |
| Early Assessment & Alert Systems | EuroScan | 3 | 1 |
| | Australia and New Zealand Horizon Scanning Network | 3 | 3 |
| Health Organizations | NHS National Library for Health | 3 | 5 |
| Related Organizations | ECRI Institute | 3 | 2 |
| Marketing authorization | U.S. Food and Drug administration (FDA) | 4 | 5.5 |
| Journals | JAMA | 3 | 3 |
| | British Medical Journal | 3 | 5 |

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handicap due to the scarcity of international experience in the area under research. However, this situation also provides an advantage, because there is a lack of bias related to previous experience from similar surveys. Earlier publications in similar areas of investigation, such as new and emerging healthcare technologies (4) provided immeasurable help in structuring the final content of the survey. The fact of having consulted the HTAi-IRG group in advance facilitated this task. However, one limitation of the present study is that no defined strategies or filters that could be used for direct identification in large international databases were found. This is an area of special interest that is ripe for investigation.

Over the past decade, some organizations have indirectly dealt with the technological substitution process, or have included variables related to this area in their results and outcomes. This is the case of the international EuroScan network, who includes in the identification process of new and emerging technologies the status of the new technology compared with those that are in use, classifying them as complementary, additional or substitute to the existing ones. It thus appears clear that regional, national and international organizations whose objectives include identifying new and emerging healthcare technologies could also be sources for POTs identification. Similarly, the appearance of

**Table 5.** Sources for the Identification of Potentially Obsolete Procedures

| Procedures | Source | Votes (Max 6) | Median |
|---|---|---|---|
| HTA Organizations | The Cochrane Collaboration | 5 | 1 |
| | Canadian Agency for Drugs and Technologies in Health | 5 | 2 |
| | National Institute for Health and Clinical Excellence (NICE) | 4 | 1 |
| | ASERNIP-S | 4 | 1.5 |
| | Agency for Healthcare Research and Quality | 4 | 2.5 |
| | New Zealand Health Technology Assessment publications | 4 | 2.5 |
| | Centre for Reviews & Dissemination (CRD) | 3 | 1 |
| | INAHTA | 3 | 1 |
| | Institute of Health Economics | 3 | 2 |
| | Swedish Council on Technology Assessment in Health Care | 3 | 4 |
| Early Assessment & Alert Systems | EuroScan | 4 | 2 |
| | Australia and New Zealand Horizon Scanning Network | 3 | 3 |
| Health Organizations | NHS National Library for Health | 3 | 5 |
| Related organizations | ECRI Institute | 3 | 2 |
| Marketing authorizations | U.S. Food and Drug administration (FDA) | 4 | 6 |
| Journals | JAMA | 3 | 3 |
| | British Medical Journal | 3 | 5 |

INAHTA, International Network of Agencies for Health Technology Assessment; ASERNIP-S, Australian Safety and Efficacy Register of New Interventional Procedures – Surgical; NHS, National Health Service; ECRI, Emergency Care Research Institute; JAMA, Journal of the American Medical Association.

**Table 6.** Sources for the Identification of Potentially Obsolete Drugs

| Drugs | Source | Votes (Max 3) | Median |
|---|---|---|---|
| HTA Organizations | Canadian Agency for Drugs and Technologies in Health | 2 | 1.5 |
| | The Cochrane Collaboration | 2 | 5 |
| Related organizations | ECRI Institute | 2 | 2 |
| Marketing authorizations | U.S. Food and Drug administration (FDA) | 2 | 5 |
| Journals | British Medical Journal | 2 | 1 |
| | JAMA | 2 | 1 |

HTA, health technology assessment; ECRI, Emergency Care Research Institute; JAMA, Journal of the American Medical Association.

new healthcare technologies could itself lead to the modification or change in status of existing technologies. This process, which might appear logical and structured to a certain extent, also involves a series of difficulties derived from the characteristics of the new technologies, because they do not always directly take the place of the existing ones; in many cases, they are complementary, supplementary or cover some areas or aspects that had not been covered before. As a consequence, the new technologies do not displace the existing ones but rather coexist with them for concrete indications, thus increasing the funds and personnel required by healthcare systems and contributing to make systems unsustainable or unviable (2). An initial estimate of the volume of possible substitute technologies out of all new technologies identified by the EuroScan network was presented to the HTAi 2008 Congress in Montreal (8). This estimate showed that a nonegligible percentage of new technologies identified by the network were labeled as substitute technologies (approximately 25 percent), meaning that if these technologies are introduced into healthcare systems, the "substituted" technologies should be removed, thus releasing funds for more efficient reinvestment.

The data and obtained results from the present study demonstrate that the identification of obsolete technologies is a difficult, complicated process, most of all because the majority of the information sources only can be used indirectly. The second conclusion that can be drawn is that already existing systems for identifying new technologies are a possible source for exploring technological disinvestment/reinvestment processes and thus, the process should be a co-ordinated one. Implementation of this type of systems, in any case, does not involve only and exclusively the identification process, but also evaluation of the indication of the displaced technology and its substitute, comparative effectiveness, cost-effectiveness and some other context dependent items. Some initiatives of this type are being carried out by the National Institute of Health and Clinical Excellence (NICE), with the aim of eliminating ineffective technologies from the British healthcare system and identifying standards of appropriate use (10;13). Both health technology evaluation reports and clinical practice guidelines play a fundamental role in this process, because they generate standard recommendations upon on which decisions with regard to concrete indications may be based. One possible process could,

therefore, be indirect identification systems derived from horizon scanning systems that could be checked against standards of practice. Existing initiatives such as the NICE project have partially investigated this type of identification but more formal studies are required to validate the method. Another method for identifying technology with little value has been the use of marginal analysis techniques (11). However, these techniques, while objective, do not fall within the scope of the present article, which is rather looking at the identification of technologies that have been displaced or substituted by others. In any case, it should not be forgotten that the final aim of health care systems is to provide users with those services that are best adapted to their needs at each moment (14) and that the results of this research are just one more step toward the maintenance of their sustainability.

However, we should never forget the invaluable role of the health professionals and their experience in this process. For instance, contact with clinical experts has been a classic method used by horizon scanning systems. In fact, one of the agencies that answered the questionnaire related to the identification sources stated that their unique source of information for POTs identification was clinical experts. We have also developed local experiences using clinical experts in the identification process (8), and we found the process extremely useful as it could provide them further arguments for a technological reinvestment in their specialties.

Finally, it should be noted that more studies such as the present one and the interpretation of their results can help to standardize the process of introducing and removing health technologies (investment/disinvestment process), in collaboration with all the stakeholders implicated in this process. Further research should take place to determine the best use of those identified and prioritized sources for the identification of the possible health technologies candidate for disinvestment processes, taking into account that this process should be continuously tested.

## CONTACT INFORMATION

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