



Cost-effectiveness analysis of the implementation of advanced practice nursing: how to move forward?

Análise custo-efetividade da implementação da enfermagem de práticas avançadas: como avançar?
Análisis costo-efectividad de la aplicación de enfermería de práctica avanzada: ¿cómo avanzar?

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ABSTRACT

This essay explores possibilities of advances in cost-effectiveness analysis (CEA) in advanced practice nursing (APN). The arguments were structured according to the current health landscape, the need to evaluate APN practices as health technology and evidence and recommendations for conducting CEA. Benefits of APN were evidenced in the improvement of indicators such as mortality, hospital readmission, among others. However, the absence of a standard of care, combined with the existence of different models and short time horizon interfered with the estimation of direct costs. The studies on CEA were inconclusive, mainly due to the lack of cost per unit of success and calculation of the CEA ratio. In the context of the APN, to conduct CEA that really contributes to robust results, thus subsidizing decision-making requires a joint effort of training institutions, delimitation and standardization of practice by regulatory agencies of the profession and health services, based especially on accreditation policies.

DESCRIPTORS

Cost-Effectiveness Evaluation; Advanced Practice Nursing; Biomedical Technology; Evidence-Based Practice.

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INTRODUCTION

The cost-effectiveness of health interventions has become an essential issue in monitoring the performance of care, a contemporary requirement of society. In this context, the dialogue between the implementation of advanced practice nursing (APN) and cost-effectiveness is directly related to the possibility of using outcome measures that indicate impacts on institutional goals such as safety, quality, efficacy in care and satisfaction of patients, but which, above all, present significant value to patients at plausible costs⁽¹⁾. The successful incorporation of this nursing model in care requires a broad assessment of the needs and possibilities of health services, the particularities of each system and the health demands of the population, facts that are closely related to the allocation of resources⁽²⁾.

APN concerns health interventions performed by nurses who have specialized knowledge, complex skills to support decision-making and clinical skills for advanced nursing practice, being an important health technology^(2,3). APN can be developed by nurse practitioners and clinical nurse specialists. Both roles are involved in providing direct and indirect patient care, especially in organizational leadership, participation or leadership in evidence-based research and practical activities and patient education⁽²⁾.

As a care delivery model, APN has been implemented in several countries to support the health systems' response to chronic diseases, need for safe and quality care, increasing health care expenditures and user satisfaction^(4,5).

Evidence from randomized clinical trials (RCT) and systematic reviews (SR) showed the effectiveness of APN functions, which point to a positive impact on indicators such as mortality, hospital readmission and therapeutic adherence, among others⁽⁶⁻¹⁰⁾. However, the effects of EPA interventions on costs proved to be dependent on the health care context and the care model; and the functions of the EPA⁽¹¹⁾. Thus, the cost-effectiveness relationship still represents a challenge^(6,7).

Thus, the scope of this essay is to explore the possibilities of advances regarding the evaluation of APN, from the perspective of cost-effectiveness, based on rational foundations related to the health scenario, on recommendations on the conduct of cost-effectiveness studies and their interface with the APN; using evidence on the impact of advanced practices, effectiveness and costs; and on the challenges around the use of cost-effectiveness analysis (CEA) in APN.

RATIONALE FOR APN IMPLEMENTATION

In the current scenario, global trends in relation to the provision of care contribute to the evaluation of the implementation of APN, from the perspective of cost-effectiveness. Population health represents one of the main drivers of the health system; the provision of care requires a conception of a continuous process in which it is important to adapt, implement and evaluate new technologies and abandon those that do not add value to the patient; and the search for a balance between clinical excellence (quality, safety, effectiveness) and population health at acceptable costs.

At the global level, health systems invariably face a paradox. On the one hand, elements such as the inversion of the age

pyramid, the increase in the burden of chronic diseases and emerging illnesses resulting from humanitarian crises and climate change are evident, which illustrate the need for unexpected and unlimited care. On the other hand, there is a growing and unmeasured increase in costs, arising from the widespread use of hard technologies (procedures, medicines, tests, equipment, among others), ineffective care interventions of dubious and unsafe quality. This imbalance can impact decision-making about the allocation of resources at different levels of management. Thus, it is essential to implement models of care delivery that can contribute to the maintenance and sustainability of health services and systems.

The sustainability of health systems is based on the pillars of improving the patient care experience (quality and satisfaction); population health (prevention and management of chronic and prevalent diseases); and the satisfaction of the care provider, which concerns professional well-being and the reduction of per capita health care costs⁽¹²⁾. This support proposed by the Institute for Healthcare Improvement (IHI) is in line with the third Sustainable Development Goal of the 2030 Agenda of the World Health Organization, which is to "ensure healthy lives and promote well-being for all at all ages," in which nursing professionals represent the main link between the population and the health system, with the aim of improving the quality of care and ensuring equitable, timely and effective management, especially in the context of chronic diseases⁽¹³⁾.

The Value-Based Healthcare (VBH) model is primarily aimed at improving the efficiency of care and is in line with such movements. In this model, value is defined as significant results achieved by the patient per dollar spent. Therefore, what matters are the outcomes (clinical, humanistic) and not just the reduction of costs and expenses^(14,15). In several countries, there is a movement seeking reforms, so that reimbursements from service providers are based on value instead of care provided⁽¹⁴⁾. The search for improved health outcomes associated with the cost of care represents an aspiration of different actors in the health system (patients, health plans, employers, service providers and government organizations)⁽¹⁴⁾.

As everyone understands that APN advances towards the reorganization of services in which the patient is central, it assumes the management of the population's health as a unique protagonist, able to contribute to the sustainability of health systems. However, in countries with free and universal health systems, such as the United Kingdom, Brazil and others, the implementation of these new health technologies requires evidence on the economic impact, not only as a subsidy for the formulation of health policies, but especially as a strategy to identify health technologies that add value to care, facts that strengthen the need to use cost-effective techniques^(16,17).

ADVANCED PRACTICE NURSING AND COST-EFFECTIVENESS ANALYSIS

CEA is an analytical technique that makes it possible to establish the relationship between cost and effectiveness of different health technologies aimed at the same clinical objective. One of its main advantages is the possibility of evaluating costs and results of specific health interventions as compared to current practice. CEA results are expressed as a

quotient, whose numerator is cost and the denominator is effectiveness (cost/effectiveness)^(17,18).

Health technologies (HT) include “drugs, equipment, technical procedures, organizational, educational, information and support systems, care programs and protocols”⁽¹⁹⁾. The breadth of this expression encompasses scientific and applied forms of knowledge, which can be used to promote, solve or mitigate health problems, as well as prevent death and improve the rehabilitation or care of the individual and the health of the population⁽²⁰⁾. Therefore, it is assumed that the APN represents a HT and, as such, its incorporation into the health system requires an assessment of safety, quality, efficacy and cost-effectiveness.

As with APN, whose implementation of care is supported by Evidence-Based Practice (EBP), cost-effectiveness also demands a critical assessment of evidence on health outcomes as a result of increased costs. Thus, these areas are interconnected and complement each other. In the scope of care management, at different levels of care, the application of this technique can contribute to the identification of cost-effective strategies and the improvement of coverage and access to health.

A significant part of the literature shows a macro view of the CEA, whose analyzes are used to allocate resources in order to maximize the health of the population in society^(17,21). However, the CEA can be quite useful if used to achieve more modest goals that are restricted to certain care contexts, focusing on providing information about the economic feasibility of implementing ST⁽²²⁾. For example, a comparison can be made between care provided in the APN model (HS1) and care provided in the traditional model (HS2), or HS1 versus care provided by physicians (HS3) in a given care setting. In this essay, this narrower conception will support the discussion of CEA.

As in other study designs, the CEA must be constructed from a problem to be clearly explained with elements that contribute to the validity of the study, such as the population of interest, a detailed description of the HT to be compared and the perspective of the study^(18,22). In this regard, it is important to consider that depending on the care needs of certain population groups, the APN would require an alternative HT (APN replacing the doctor); and in other contexts, it may be an HT that is complementary to the physician's. In alternative models, the APN can contribute to the provision of care similar to that of physicians, i.e., replacing this professional. In complementary models, it can add quality and activities to patients' health⁽¹¹⁾. Thus, the purposes of the models can be quite different, an aspect that impacts the CEA problem. In the first, the intention of the cost-effectiveness analysis may be related to cost reduction or resolution of the shortage of physicians, whose strategy can maintain or improve the quality of care. In the complementary model, the objective may be to obtain better health outcomes, such as safety, quality, and patient satisfaction, among others. Therefore, the choice of models directly related to the problem of cost-effectiveness analysis⁽²³⁾.

In CEA, another important issue is the selection of the analysis perspective that represents the point of view from which the study will be carried out (e.g., society, private or public service provider, industry, among others)^(17,18). The perspective must be consistent with the purpose of the CEA and obviously

be focused on the problem to be solved. Health outcomes and cost indicators are defined from one perspective. The perspective of society is usually ideal, as it considers costs for the health system, the individual and the loss of productivity. However, this perspective, for many HT are of little use and not practical. In this case, the more restricted ones, such as health services (public, private, health plan) or patients themselves, help to define more clearly the types (direct and indirect) and respective cost categories (material resources, human resources, infrastructure) to be considered in the CEA.

In economic analyses, the term “intervention” is broad, including care and programs used in health promotion, disease prevention, treatment, rehabilitation, or palliative care. In cost-effectiveness studies, the description of this concept requires objective and precise information about elements, such as frequency and time of use, dose, when it should be applied, among others. This detailing is essential for the interpretation of health (clinical) outcomes and costs⁽¹⁷⁾.

The term result, commonly used in economic studies, represents health outcomes/effects, which, in CEA, are measured in clinical units and can be expressed in physiological measures (e.g., blood pressure, pain, skin healing, among others), biochemical (e.g., glycemia, hemoglobin, among others) or behavioral (e.g., adherence to therapy, reception, among others)⁽²⁴⁾. The wide variety of possibilities for outcome measures favors the application of APN in different care contexts, considering different age groups for the evaluation of numerous interventions. Thus, indicators of care quality, such as falls, phlebitis, medication errors, pressure injuries, unplanned extubation and nursing-sensitive indicators can be used to assess the impact of nursing on patient care⁽²⁵⁾.

For cost estimation, it is necessary to select cost types (direct, indirect) and categories (e.g., health professionals, materials used in carrying out a procedure, medicines, among others) that can represent the resources used in the production of care. In general, direct costs, as they are directly related to the provision of care, are used more frequently. On the other hand, indirect costs, which are related to the individual's loss of productivity resulting from treatment or disease, are less evaluated^(6-10,26).

The time horizon refers to the duration of the study, which must be sufficient and appropriate to capture the results of interest and the corresponding costs^(17,18,26). In general, one that is related to the natural course of the health condition analyzed is adopted to assess the potential impact of interventions.

From the identification, calculation, comparison of clinical outcomes and costs of the different HTs, the incremental cost-effectiveness ratio (ICER) must be established in order to assess whether the additional cost of a given HT is offset by the extra unit of effectiveness^(22,26). In conducting the CEA with the APN, this criterion, which contributes to the qualification of almost all the studies⁽⁶⁻¹⁰⁾, was absent, a fact that makes decision-making difficult.

In the context of economic analyses, another essential concept requiring application in discussions about CEA applied to APN, is opportunity cost. This term represents that the use of resources in the incorporation of certain HT implies not providing them in other HT⁽²⁶⁾. A practical illustration of the concept is the case in which the use of financial resources in

primary health care (PHC) must be decided, comparing the APN and the general practitioner for the outpatient monitoring of diabetic patients. Which of these TS to choose? The most rational choice will be the one with the best cost-effectiveness ratio, since the opportunity cost represents the lost benefit due to a given choice⁽²⁶⁾.

In the economic evaluation of APN, the most used instrument was the Quality of Health Economic Studies (QHES), designed to assess the quality of cost minimization, cost-effectiveness and cost-utility studies⁽²⁷⁾. The QHES, despite having fewer criteria in relation to international guidelines^(17,18), proved to be valid and appropriate for the analysis of this HT⁽²⁷⁾.

EVIDENCE ON THE IMPACT OF APN: EFFECTIVENESS AND COSTS

In order to analyze the APN from the parameters of safety, efficacy, quality and cost-effectiveness used in the evaluation of HT, evidence from systematic reviews (SR) was used, whose conducts followed some criteria of methodological rigor. The authors assessed the risk of bias in SRs using the Cochrane Risk of Bias⁽²⁸⁾; for the economic analyses, the Quality of Health Economic Studies (QHES)⁽²⁷⁾ was used and the quality of evidence for individual outcomes was assessed using the Grading of Recommendations, Assessment, Development and Evaluations (GRADE)⁽²⁹⁾.

The methodological review consisted of four components (narrative review on economic assessment of APN functions; assessment of APN economic analyses quality; review of guidelines for economic assessment; and expert panel) and examined the relevance of using the Guidelines for the Economic Evaluation of Health Technologies⁽¹⁸⁾ in the evaluation of economic studies conducted at APN. The authors concluded that the guideline was appropriate, despite about half (7/15) of the sections they included (problem, type of economic assessment, comparators, study perspective, effect measurement, health measurement and assessment, and use of resources and costs assessment) may require specific additional clarification and guidance to capture the assessed costs and effects. In this sense, this application can strengthen the quality of future economic evaluations related to APN⁽²³⁾.

In PHC, the SR was conducted with RCT (n = 11), whose objective was to determine the cost-effectiveness of APN. It was identified that about one third (36.4%) of the articles jointly evaluated effectiveness and costs, a basic assumption of the CEA. Regarding the rigor of the cost-effectiveness analysis, carried out through the QHES, the majority (63.6%) of the studies presented low quality⁽¹³⁾. In this SR, whose results were evaluated mainly in patients with chronic diseases, and included blood pressure, serum lipid levels, satisfaction (family and patient), quality of life, among others, it was found that the patient's follow-up time ranged from weeks to years. Cost estimates included consultations, emergency room visits, hospitalization, laboratory tests, medications, and indirect (family) costs. The authors concluded that in the primary outpatient clinic, APN, as an alternative HT, i.e., compared to the general practitioner, showed similar or superior effectiveness and was potentially more cost-effective. And regarding the analysis of the APN in specialized outpatient clinics as an

alternative HT to the doctor, the findings were inconclusive, while the APN, as a complementary function to that of the doctor, improved effectiveness. The cost-effectiveness relationship expressed fragility⁽⁶⁾.

In the transition of care (TC) that concerns the patient's journey in a health service or transfer from one health scenario to another, an SR was carried out with the purpose of evaluating the efficacy and cost-effectiveness of APN. A total of 13 RCTs were included, which evaluated 2,463 participants divided into four groups: postoperative oncology, heart failure, older adults, high-risk pregnant women and low birth weight babies. Efficacy was measured through therapeutic adherence, functionality, falls, use of potentially inappropriate medication, infection, immunization, quality of life, readmission, mortality and patient satisfaction. Among caregivers, measures of efficacy included physical symptoms, depression, and anxiety. Costs related to nursing, daily cost of hospital, home care and caregivers were estimated. Regarding the findings related to efficacy, the authors observed a reduction in mortality (cancer patients), a reduction in mortality and readmission, an improvement in therapeutic adherence and satisfaction (patients with heart failure). Among older adults, there was a reduction in readmission and length of stay and for their caregivers there were less depression. Regarding pregnant women and their babies, there was an improvement in infant immunization rates and maternal satisfaction with care and a reduction in hospitalization. Except for the RCTs conducted in the postoperative period, the other studies indicated a reduction in costs, especially in terms of hospitalization. None of the studies evaluated cost-effectiveness. The authors concluded that the evidence on the efficacy and costs of APN in CT was of low quality and that there is a need for research that includes robust economic assessments⁽⁷⁾.

Quality assessment of CEA studies in APN was compiled in an SR conducted with RCTs (n = 43) in three areas of care: outpatient, transition of care, and hospitalization. The objective of the RS was to assess the quality of RCTs conducted with APN that performed CEA. The authors concluded that, although almost half of the RCTs present a low risk of bias, fundamental elements such as incomplete reporting of the study method, lack of detailed description about the "interventions," experience and roles by nurses, made it difficult to assess internal and external validity of RCTs. Thus, there is still a need for more robust evidence to answer policymakers' questions on cost-effectiveness of APN functions⁽⁸⁾.

Another SR evaluated the quality of the economic analysis conducted in RCTs, whose intervention was the APN in different care settings, using the QHES. It was observed that the majority (77%) of the RCTs presented low quality and only 7% presented high quality, in which four criteria were met: specification of measurable objectives, pre-specification of subgroups for analysis, justified conclusions based on the results of the study and disclosure of the funding source. The items effectiveness, incremental analysis and uncertainty assessment were not included in the study or were not clearly explained. The QHES was a useful tool as it identified key economic criteria. The authors recommend that future studies on the subject be more rigorous in relation to cost and effectiveness indicators and that there

is a combination of both, in order to estimate the incremental cost-effectiveness⁽⁹⁾.

The HT applied in different scenarios proved to be robust, of quality and capable of generating benefits for patients, family/caregiver and the health system⁽⁶⁻⁹⁾. Despite this, future RCTs must overcome some aspects evidenced, such as the small number of nurses practicing APN or comparators (doctors), problems in randomization, lack of outcomes sensitive to specific APN interventions and loss of patient follow-up^(8,10).

In general, in the analysis of these SR, some elements were observed that are certainly inherent to the provision of care, however, they can compromise the CEA and result in fragile studies. The lack of a standard of care offered by the APN (e.g., in some cases there was a visit, while in others there was the prescription of medication or patient monitoring, among others), combined with the way in which the intervention was tested (alternative or complementary HT), small time of follow-up of patients (temporal horizon) (a week), an aspect that may not portray the effects of the intervention on health status, especially in cases of education of patients with chronic diseases, as well as not representing the direct and indirect costs. Additionally, the studies comprising the SRs were compromised by the lack of presentation of results inherent to the CEA, such as the relationship C/E, establishing the cost per unit of success and the achievement of the ICER.

CHALLENGES ON THE USE OF COST-EFFECTIVENESS ANALYSIS IN ADVANCED PRACTICE NURSING

In the context of the APN, conducting CEA that contributes to robust results and can support decision-making requires the appropriation of knowledge related to the evaluation of HT, in which effectiveness and costs, despite being fundamental indicators, represent a part of the whole.

Part of the challenges to be overcome in the evaluation of APN as a HT was evidenced in the methodological review that examined the relevance of using the instruction of the Guidelines for the Economic Evaluation of Health Technologies⁽¹⁸⁾ in the evaluation of economic studies conducted in the APN. The authors concluded that the Guideline was appropriate, despite about half (7/15) of the sections requiring specific adaptations and additional guidance in order to achieve costs and effects. Thus, the quality of economic evidence related to APN can be strengthened by the use of the guideline in conducting studies⁽²³⁾.

In CEA, costs are expressed per unit of success, an aspect that can be quite complicated and potentially limit the evaluation of the APN. Numerous results, especially hard ones, such as reduced mortality and amputations, among others, are not necessarily achieved through a single intervention. There is a need for a set

of interventions, which are often shared by different actors in the health system⁽²³⁾. Therefore, one of the main challenges of CEA in advanced practice nursing, when compared to the physician, is the selection of an outcome of common interest. e.g., rate of return to service or adherence to therapy that portrays the cost per units of success.

The estimation of costs, contrary to what is imagined, represents one of the main points of conflict of CEA in the APN. Costs need to be measured (physical units) and calculated (application of unit costs according to the volume of resource use and time horizon). In APN, the use of microcosting to estimate direct costs represents a very useful alternative, as it provides calculations of costs per unit (e.g., cost/patient, cost/month, cost/professional, among others), in a very precise way, although it cannot be generalized⁽²⁶⁾.

In the APN of the CEA, the use of "big data," i.e., an integrated information storage system (e.g., sociodemographic, clinical, monetary, among others) can help in the collection of evidence, especially on hard outcomes and during long time horizon. In addition, "big data" can contribute to the analysis of success and failure, cases combined with different HTs, as attributes that have an important impact on costs⁽³⁰⁾. However, in the context of APN, the successful use of this tool may be linked to the use of standardized language, such as the Nursing Outcomes Classification (NOC), used to measure the results of clinical nursing practice.

Finally, one of the biggest challenges is for the CEA to reflect the complexity of the APN, which is characterized by an interaction of skills (clinics, research, education and leadership), acting in different care contexts and providing care to diverse groups (patients, community, service providers, hospitals).

In an optimistic view, it is believed that many of these challenges can be overcome since the CEA, as well as the APN, are widely discussed and disseminated in training institutions, service providers and regulatory bodies of the practice.

CONCLUSION

The use of new methodological references such as the CEA can help to understand the impact of APN practices and build paths for a robust and acceptable implementation of this HT in the context of public policies. In addition, CEA can advance towards service innovations, whose decision-making is focused on cost-effective alternatives, i.e., more rational alternatives. To achieve this end, an orchestrated work among institutions that train human resources is essential, as well as the delimitation and standardization of practice by the regulatory bodies of the profession and health services, which can be supported by policies and accreditation.

RESUMO

O presente ensaio explora possibilidades de avanços na avaliação custo-efetividade (ACE) da enfermagem de práticas avançadas (EPA). Os argumentos foram estruturados segundo o panorama de saúde atual, necessidade de avaliação das práticas da EPA, como tecnologia em saúde, evidências e recomendações para condução de análise custo-efetividade. Benefícios da enfermagem de práticas avançadas foram evidenciados na melhora de indicadores como mortalidade, readmissão hospitalar, entre outros. Todavia, a ausência de um padrão de cuidados, combinada com a existência de modelos distintos e curto horizonte temporal, interferiram na estimativa de custos diretos. Os estudos foram inconclusivos acerca da análise custo-efetividade, sobretudo pela ausência de custo por unidade de sucesso e cálculo da razão ACE. No contexto da enfermagem de práticas avançadas, a condução de análise custo-efetividade que contribua com resultados robustos, subsidiando na tomada de decisões, requer

esforço conjunto de instituições formadoras, delimitação e normatização da prática por órgãos reguladores da profissão e, de serviços de saúde, alicerçados, especialmente em políticas de acreditação.

DESCRITORES

Avaliação de custo-efetividade; Prática avançada de enfermagem; Tecnologia biomédica; Prática clínica baseada em evidências.

RESUMEN

Este ensayo explora las posibilidades de avances en la evaluación de costo-efectividad (ECA) de la enfermería de práctica avanzada (EPA). Los argumentos se estructuraron según el escenario de salud actual, la necesidad de evaluar las prácticas de la EPA, como tecnología sanitaria, evidencia y recomendaciones para realizar análisis de costo-efectividad. Los beneficios de la enfermería de práctica avanzada se evidenciaron en la mejora de los indicadores como mortalidad, reingreso hospitalario, entre otros. Sin embargo, la falta de un estándar de cuidados, combinado con la existencia de diferentes modelos y el corto plazo, interfirió en la estimación de los costos directos. Los estudios no fueron concluyentes sobre el análisis de costo-efectividad, principalmente debido a la falta de costo por unidad de éxito y cálculo de la relación ACE. En el contexto de la enfermería de práctica avanzada, la realización de análisis de costo-efectividad que contribuya a resultados robustos apoyando la toma de decisiones requiere un esfuerzo conjunto de las instituciones de formación, delimitación y estandarización de la práctica por parte de los organismos reguladores de la profesión y los servicios de salud fundamentados, especialmente, en las políticas de acreditación.

DESCRIPTORES

Evaluación de Costo-Efectividad; Enfermería de Práctica Avanzada; Tecnología Biomédica; Práctica Clínica Basada en la Evidencia.

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