

OUT OF POCKET COSTS IN PATIENTS WITH BREAST CANCER: A SYSTEMATIC REVIEW

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Costos fuera de bolsillo en pacientes con cáncer de mama: una revisión sistemática

Resumen

El objetivo del presente artículo fue revisar la literatura publicada entre 2000 y 2016 sobre gastos de bolsillo en pacientes con cáncer de mama. Se realizó una revisión sistemática, realizada en las bases de datos Ebsco, Medline, Scencedirect, Proquest y Google Scholar. Se incluyeron artículos que en el título y/o palabras clave tenían los términos: "Carga económica", "Gastos de bolsillo" y "Cáncer de mama" con estimaciones de gastos de bolsillo anuales o mensuales. Se revisaron 27 artículos y solo 5 cumplieron con los criterios de selección, llevados a cabo en Canadá (2), Estados Unidos (1), India (1) y Haití (1). El gasto de bolsillo mensual más bajo se encontró en Haití: U\$ 66,62 y el más alto en Canadá (Terranova): U\$371,7. El gasto de bolsillo es un elemento importante para las economías de las pacientes con cáncer de mama y sus familias. Es necesario identificar la relación entre este con las barreras para acceder a los servicios de salud.

Palabras clave: Gasto de bolsillo, cáncer de mama, carga económica.

Frais de poche chez les patients atteints de cancer du sein: une revue systématique

Résumé:

L'objectif de cet article était de passer en revue la littérature publiée entre 2000 et 2016 sur les menus dépenses des patientes atteintes d'un cancer du sein. Une revue systématique a été réalisée dans les bases de données Ebsco, Medline, Science Direct, Proquest et Google Scholar. Les articles inclus dans le titre et / ou les mots-clés avaient les termes: "Charge économique", "Dépenses personnelles" et "Cancer du sein" avec des estimations des dépenses personnelles annuelles ou mensuelles. 27 articles ont été examinés et seulement 5 répondaient aux critères de sélection, menés au Canada (2), aux États-Unis (1), en Inde (1) et en Haïti (1). es dépenses de poche mensuelles les plus faibles ont été constatées en Haïti: 66,62 \$ U et les plus élevées au Canada (Terre-Neuve): 371,7 \$ U. Les dépenses personnelles sont un élément important pour l'économie des patientes atteintes d'un cancer du sein et de leur famille. Il est nécessaire d'identifier la relation entre celle-ci et les obstacles à l'accès aux services de santé.

Mots clés: Menues dépenses, cancer du sein, fardeau économique.

Out of pocket costs in patients with breast cancer: a systematic review

Abstract:

The objective of this article was to review the literature published between 2000 and 2016 on out-of-pocket expenses in patients with breast cancer. A systematic review was carried out in Ebsco, Medline, Science Direct, Proquest and Google Scholar databases. Articles included in the title and / or keywords had the terms: "Economic burden", "Out-of-pocket expenses" and "Breast cancer" with estimates of annual or monthly out-of-pocket costs. 27 articles were reviewed and only 5 met the selection criteria, carried out in Canada (2), United States (1), India (1) and Haiti (1). The lowest monthly pocket expense was found in Haiti: U\$ 66.62 and the highest in Canada (Newfoundland): U\$ 371.7. Out-of-pocket spending is an important element for the economies of breast cancer patients and their families. It is necessary to identify the relationship between it and the barriers to access health services.

Keywords: Out-of-pocket expenses, breast cancer, economic burden.

Artículo de Investigación

Out of pocket costs in patients with breast cancer: a systematic review

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INFORMACIÓN DEL ARTÍCULO

Recepción del artículo: 15/03/2019
Concepto de evaluación: 15/04/2019
Aceptación del artículo: 01/06/2019

INTRODUCTION

Breast cancer (BC) is the most common malignancy in women (DeSantis et al, 2016), with an incidence close to 1,7 million cases (Ferlay et al., 2015) and it is responsible for 14% of deaths from all types of cancer (Mina & Mina, 2016). The health care management of this disease places a significant economic burden on health systems, financed mainly by public and private organizations (Kutzin & Sparkes, 2016), and for individuals, who assume the part of the economic burden known in the literature as “out-of-pocket expenses in health” (OPEH) (Banerjee, 2016). OPEH are defined as the direct and indirect items paid by patients and/or their families (Xu et al., 2003) for hospitalization, medications, outpatient procedures, diagnostic aids as well as the indirect expenses such as transportation, special meals, moderating fees, co-payments, among others (Tanvejsilp et al., 2018).

The amount of money spent by patients and/or their families could be so high in relation to their income, and they could experience a “catastrophic expense” (Kerschner, 1986), that is, when OPEH exceeds 40% of the household’s payment capacity. In turn, the household’s payment capacity is defined as the total household income, subtracting the necessary expenditure to cover basic subsistence needs (Huffman et al., 2011; Amaya, 2016).

Considering the high incidence of BC, and its implications on clinical (Runowicz et al., 2016; Snyder et al., 2016), social (Drageset et al., 2016; Fong et al., 2017), individual (quality of life) (Paek, Levine & Avis, 2016; Yan et al., 2016) and financial aspects of life (Boyages et al., 2017; Jensen et al., 2017), it is important to analyze the scientific literature regarding OPEH in BC. We reviewed and synthesized the literature to serve as a basis for decision making.

METHODS

A systematic review of literature, of researches that estimated OPEH in BC, in the databases: Ebsco Medline, Science Direct, Proquest and Google Academic, with articles published during the years 2000 to 2016. Inclusion criteria were:

- Have been published in at least one of the databases mentioned above.
- To have in title and/or keywords the terms: "Economic Burden and/or Out of pocket, and Breast Cancer".
- Estimate the annual or monthly OPEH.
- Contain a summary: this criterion was used as a filter to separate the works produced by scientific research from those that are not.
- To Present economic, administrative, health and epidemiological approaches.

All the published articles were identified and quantified, as well as the letters to the editor, the summaries and presentations in congresses. In accordance with the Cochrane methodology (Koretz, 2017), the key words used for the identification were: prospective study, retrospective study, population study and economic analysis. We excluded works with exclusively qualitative results, and those that manifested conflicts of interest.

Each study was analyzed individually and independently by the researchers, using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement for purposes of determining internal validity (Moher et al., 2016; Shamseer et al., 2015). Out of 27 articles with key terms in their title and/or keywords, only five studies met the other selection criteria, for description according to internationally accepted recommendations for the bibliography search (Clarke, 2009; Wolf, 1986; Watson, 2015): one developed in the United States, two in Canada, one in Haiti and other in India.

RESULTS

Not all articles were comparable to purchasing power parity, but for this purpose, the values were calculated in dollars at constant prices of 2016, using the average exchange rate (Vorst, 1986), the consumer price index (Boskin et al., 1998) and the conversion factor of 2016 (Blanchet, 2017), all official data of the World Bank, finding that, in the work carried out in the United States, on average they spent U\$352,37 monthly and white women spent less.

United States

One article, by Pisu et al. (2011) studied OPEH in white women (WW) and women of minority ethnic origin (MEO), in the United States, using data from a retrospective study of the Breast Cancer Education Intervention program (BCEI). Their "cases" were defined as women aged ≥ 21 years, with a confirmed BC diagnosis in stage I-II, with a maximum of two years since diagnosis and at least one month after the start of treatment (surgery, radiotherapy and/or chemotherapy). The data collection instruments used were: Breast

Cancer Finances Survey (BCFS) and Breast Cancer Treatment and Sociodemographic Data Tool (BCTSDT). These surveys were self administered at a regional cancer and oncology center in the southeastern United States. The OPEH was estimated using a generalized linear regression model with gamma distributions and logarithmic-link functions because of to the marked asymmetry in the distribution of costs. For each category of the OPEH, a separate model was developed for the MEO and the sociodemographic and treatment characteristics that were significantly different between the WW and the MEO as covariables.

The study included 261 subjects: 215 WW (82,3%) and 46 MEO (17,6%). Significant differences were found (Fisher <0,05) between lower income groups and in the treatment received and sociodemographic characteristics, according to: stage of the disease (stage I: 62,2% and 43,5%; stage II: 56,5%WW and 37,8%MEO), rural area of residence (23,3% and 6,5%), treatment received (chemotherapy 50,7% -69,6%; chemotherapy and radiotherapy: 28,4% -50,0% and radiation: 39,5% -26,1%) for WW and MEO respectively. The results were expressed in US dollars of 2008. 93% of the subjects incurred OPEH and the monthly average for both ethnic groups was US\$316,1. The average expense of the WW was US\$297,3, while the MEO spent US\$405,6 per month. In similar proportions, WW and MEO concentrated their expenditure on hospitalization, medical fees, prescriptions, over-the-counter medications and alternative treatments. Lower-income MEOs spent more of their money in OPEH than WW. The OPEH was an important burden for the survivors of BC, which was between the range of 7,8% -12,6% and 7,5% -31,4% in WW and OPEH respectively.

Canada

Two studies were Canada-based, in different regions. Lauzier et al., (2013) report on a retrospective cohort study (Lauzier et al., 2008; Lauzier et al., 2010) performed in eight hospitals in Quebec. The OPEH was estimated in women who had a BC diagnosed in 2003 and their husbands. Participants were recruited through the lists of surgeries, chemotherapy and pathology reports. Women under 18 years of age, women with a previous history of BC or another cancer and/or metastasis at the time of diagnosis were excluded, as well as those who could not participate in the interview. Three questionnaires were applied (Lauzier et al., 2010) in the first, sixth and 12th month after the initiation of treatment. OPEH was defined as the amounts of money paid directly by women and their husbands, as a result of the diagnosis and treatment of cancer, excluding loss of salary.

The first survey collected personal information that could influence the expenses of the patient and her husband, demographic and socioeconomic information. The six-month survey focused on collecting information related to coadjuvant treatments and their costs, and the survey at twelve months collected information on the final treatments and other types of costs. Women who did not receive any specific type of treatment were excluded; treated women who did not experience OPEH were assigned the value of zero. Data were analyzed using a generalized linear model log-link and a Poisson model, with Sandwich estimators of minimum variance. Initially univariate models were run to exclude non-significant variables and the risk of incurring higher OPEH was identified as that greater than or equal to \$1.773, through a linear trend test.

The final sample was 800 patients; of this group, 541 (86,6%) reported having a partner, of which only 391 (72%) answered the 3 questionnaires. More than a third of women

(39,9%) and couples (38,1%) were in the age range of 50 to 59 years. A little more than half (57,4%) and (71,4%) were working at the time of diagnosis; the majority of subjects (86,6%) had invasive breast cancer; 79,6% had partial mastectomy and 86,6% had adjuvant therapy.

The average OPEH in the first year of treatment was estimated at U\$1.365 Canadian dollars in 2003 (U\$114,2 per month), discounting any financial aid received. On average, the cost related to surgeries, adjuvant treatments and follow-up was U\$716. The husbands spent an average of U\$234, mainly related to travel and accompanying the patient; it represented an average of 9% of the couple's total expenses. Total OPEH increased according to family income. The more income, the higher the expenditure: Median of OPEH according to income was U\$678 for <U\$30.000 income, U\$1061 for U\$30.000 to \$49.999, U\$1004 for U\$50.000 to \$79.999 and U\$1359 for \$80.000 and more. The proportion of OPEH with respect to the annual income of the families was 2,3%.

The other Canadian study (Housser et al., 2013) was executed in Newfoundland and Labrador. The relationship between OPEH and savings strategies linked to the treatment and use of drugs in breast and prostate cancer was studied. The researchers applied a self-administered survey during the 2008-2009 period. The surveys were distributed to all regional cancer clinics, support groups, and removals throughout the province and sent by mail to individuals who identified themselves through the cancer population register. Participants were defined as any respondent aged 19 years or over, resident in Newfoundland, diagnosed with BC, without a history of treatment for other cancers, and not participating in any clinical trial. The information collected from the accounts recorded demographic and socioeconomic information. It included questions about the use of savings strategies related to the treatment and use of medicines, and information about the opinions about the OPEH and the assistance programs.

OPEH was defined as "expenses not covered by the insurance or assistance program". The items included expenses for drugs and supplies, transportation, meals and lodging for both the patient and the companion. Expenses were considered quarterly, and family income information was consulted annually. A 5-point Likert scale was used in the elaboration of some questions from the questionnaire. The answers to some questions about savings strategies had to be reformulated in two major variables: "Use any drug-related savings strategy" and "any medical appointment-related savings strategy." 131 women participated. The Chi-square test was used to observe the differences in OPEH responses related to the proportion of the income spent on the costs associated with treatment. Where significant differences were found, the post-hoc Chi-square test was additionally applied to identify the specific groups that differed.

The majority of the participants (70,0%) were under 65 years old, they lived in rural areas (63,1%) and had a partner (80,2%). Almost 3 out of 10 women did not finish high school, while only 1 in 10 earned a professional degree. 38,8% of participants spent U\$0 on OPEH, 36,6% spent between \$0,01 and U\$500 and 25% more than U\$500. In terms of income spending, 38,9% spent 0,0%, 42,0% between 0,01% and 7,49%, and only 19,1% spent 7,5% or more of their income. The average OPEH, in the three months prior to the application of the survey, was U\$168,1 for those who had spent between U\$0,01 and U\$499,99, and \$10.000 for those who spent U\$500 or more.

Haiti

Another study was carried out by O'Neill and Cols., in Haiti, and published in 2015 (O'Neill et al., 2015), at the University Hospital of Mirebelais (UHM). This hospital provides free attention - which is why many people travel from different parts of the country to receive specialized care. The researchers performed a convenience sample (Nahar & Costello, 1998) of patients arriving, by diagnosis, chemotherapy or bed surgery, on the days the research assistant was available. Questionnaires were applied from the month of March to May 2014. The final sample was 61 participants, collecting demographic and socio-economic information. The amounts of money were recorded in Gourdes (gdes) or Haitian dollar (HD) - which were then converted to US dollars (USD), using an exchange rate of 45 gdes/1 USD and 5 gdes/1 HD. The expenses of the patient and the companions were taken into account in the register of the financial burden. Medical expenses included medicines, supplies and expenses in diagnostic tests.

The average annual expenditure per participant was U\$717, of which U\$551 were medical expenses in one year of treatment. 98% of the participants were working before developing the cancer, and 89% stopped doing so due to the disease. Patients resorted to several sources of funding to cover medical expenses, including help from family members (70%); getting a loan (52%); and using savings (49%) (These percentages are not exclusive to each other because it was a multiple-choice question.) Only 62% could estimate their annual income (\$1.333 on average). 68% of the participants spent more than 40% of their income on medical expenses. That is to say, more than two thirds presented catastrophic health expenditure, despite the gratuitousness of care in the HUM.

India

Finally, the most recent study on OPEH included in this review was conducted in Punjab, India, by Jain & Mukherjee, and published in 2016 and corresponded to patients with a primary BC diagnosis, between April 2012 and March 2013, in 22 districts of Punjab. The reference population was 3,230, and a final sample of 221 was selected, using proportional probability and a systematic random sampling. OPEH was defined as all care related expenses from the time the patient received medical services, including payments for medical consultation, medication, hospitalization costs and diagnostic costs. Catastrophic spending was defined as OPEH, excluding reimbursements, greater than or equal to 40% non-food expenditure of families. A multivariate logistic model was used that was built with statistically significant variables for the analysis. Most of the participants were housekeepers (99%), aged less than 60 years (79%), residing in rural areas (56%), and their homes had 6 members on average.

It was found that it was up to 2,38 times more expensive to attend a private center than a public one. With increasing clinical stage, costs for care increased. 92% of patients financed their treatment with OPEH, while 8% did so through health insurance. Because of this, 84% of households experienced catastrophic expenditure (CE). The households with low and medium incomes were 39,4 and 5,8 times more likely to have CE than those with higher incomes, and if the treatment was done in a private center, they were 62,2 times more likely to incur catastrophic expenses than those who did it in public centers.

Households that had health insurance financed the treatment mainly with savings (85%), low interest loans (55%), friends' help (55%), and the sale of financial assets (30%). None

of the households that had health insurance experienced financial problems. Those who financed the treatment exclusively with OPEH did so with loans (88%), help from friends (77%), savings (73%), sale of financial assets (55,7%) and 54% delayed payment of pre-existing loans. In general, there was an association with experiencing catastrophic expenditure with the use of private facilities for care, being in the second stage of cancer and having low income. The OPEH average was 429,199 per year per patient.

A brief summary of results can be viewed in table 1.

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DISCUSSION

The OPEH constitutes a substantial part of the expenses of BC survivors and their families (Zafar et al., 2013), especially those with low income (Moore, 1999). Most of these costs are for medical care, including hospital bills and medications (Arozullah et al., 2004). Although OPEH usually decreases over time as women move from diagnosis and active treatment phase to being survivors (Ershler, 2003), it has been found that 13,4% of cancer patients spend more than 20% of their income in OPEH. This burden can be translated into significant deprivation (Weaver et al., 2010).

All the articles included in this review studied OPEH from different perspectives, but each one provides interesting information. For example, the study by Pisu et al. (2011), in the United States, focused on determining differences between white women with those of minority origins - the latter associated with higher prevalence of poverty - and showed lower OPEH among the white women, probably because more of them have health insurance which covers a greater number of items.

The Canadian studies stand out for their methodological rigor. Lauzier et al.(2013), used the largest sample size of the investigations included, and also calculated the OPEH for the spouses, by applying 3 surveys, one every six months. Housser et al. (2013), stand out for studying the relationship between OPEH and savings strategies linked to the treatment and use of medications using a Likert scale.

The work of O'Neill et al. (2015) carried out in Haiti, consisted of a pilot test in patients receiving free-of-cost health care, so that their results cannot be referred to the reference population. The work of Jain & Mukherjee (2016) in India stands out for the comparison of the costs of care between public and private centers, and its relationship with the propensity of people to incur catastrophic expenses.

In the work of Lauzier et al. (2013) in Canada, the monthly GSB was U\$127,09 in the participants and U\$21,83 in the husbands, while Housser et al. Differentiated the OPEH into two categories: U\$0,01 to U\$499,99, and U\$500 and up, with the OPEH of U\$62,48 in the first group, and U\$371,7 in the second. On the other hand, Jain & Mukherjee (2016), for Punjabi women from India, determined an OPEH of U\$623,36, the highest of the 5 articles, while the lowest one was found in Haiti, another undeveloped country: U\$66,62. However, not all studies includes husbands as part of the sample, which could affect the results (Yuan et al., 2017) [], since they are the ones who, in a large percentage of cases, are responsible for the household's income. Also, they will not explore the OPEH in cases of advanced BC, which is understandable by the state of the patients, but could make use of other sources, such as family members (Lee & Knobf, 2016).

CONCLUSIONS

Pocket Expenditure is an important item for the economies of breast cancer patients and their families. It is necessary have in count that BC affects the quality (Oberguggenberger et al., 2018), the quantity of life (Ell et al., 2008) and the economic well-being of the survivors (Nekhlyudov et al., 2016; Zheng et al., 2016) coming to be considered to the costs of the patients as "another side effect" of the cancer treatment, so that it should be investigated if these costs act as barriers to obtain the recommended and necessary care, since the OPEH found in the different studies is different, and should be considered in terms of variables such as: insurance and type of health system, which are fundamental as determinants of equity and opportunity in health care. Also, it is necessary to identify the relationship between this with barriers to health services access and other variables that could influence pocket expenditure (Riggs & Ubel, 2014).

Table 1
Summary of the main results

| Authors | Country | Year | Sample | GSB monthly# |
|----------------------------|--------------------|------|--------|--------------|
| Pisu et al. (2011) | USA | 2008 | n=261 | \$352,37* |
| Lauzier et al. (2013) | Canadá (Québec) | 2011 | n=800 | \$127,09** |
| Housser et al. (2013) | Canadá (Terranova) | 2009 | n=131 | \$371,7*** |
| O'Neill et al. (2015) | Haití | 2014 | n=61 | \$66,62 |
| Jain and Mukherjee. (2016) | India (Punjab) | 2013 | n=221 | \$623,36 |

International Dollar; *\$331,41 for white women, and \$452,14 minority women;

** husbands (n=391): U\$21,83; *** with expenses of U\$500 or more

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