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To cite this article: Joshua Noone & Christopher M. Blanchette (2017): The value of self-medication: summary of existing evidence, Journal of Medical Economics, DOI: [10.1080/13696998.2017.1390473](https://doi.org/10.1080/13696998.2017.1390473)

To link to this article: <https://doi.org/10.1080/13696998.2017.1390473>



Accepted author version posted online: 10 Oct 2017.
Published online: 03 Nov 2017.



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REVIEW

The value of self-medication: summary of existing evidence

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ABSTRACT

Aim: The aim of this review was to identify the international evidence that is currently available on the economic value of self-care through responsible self-medication, in terms of the measures related to access to treatment, time, and productivity.

Methods: A targeted literature search was conducted for 1990–2016, including data gathered from members of the World Self-Medication Industry and searches on PubMed, EBSCOHost, and Google Scholar. Specific searches of individual drug classes known to be switched to non-prescription status in this period were also conducted.

Results: A total of 71 articles were identified, of which 17 (11 modeling studies, six retrospective analyses) were included in the review. Evidence from modeling studies and retrospective analyses of grouped data across a range of common conditions for which non-prescription medications are available in different countries/regions showed that the use of non-prescription products for the treatment of common conditions or for symptom management (e.g. allergies, chronic pain, migraine, vaginitis, gastrointestinal symptoms, or common cold symptoms) had considerable value to patients, payers, and employers alike in terms of cost savings and improved productivity. Potential benefits of self-medication were also identified in preventative healthcare strategies, such as those for cardiovascular health and osteoporosis.

Limitations: This review was limited by a targeted, but non-systematic approach to literature retrieval, as well as the inclusion of unpublished reports/white papers and patient self-reported data.

Conclusions: The evidence identified in this literature review shows that responsible, appropriate self-medication with non-prescription products can provide significant economic benefits for patients, employers, and healthcare systems worldwide.

ARTICLE HISTORY

Received 11 August 2017
Revised 12 September 2017
Accepted 14 September 2017

KEYWORDS

Economic value; health resources; literature review; non-prescription; self-care; self-medication

Introduction

Self-care encompasses all the actions that people take to maintain their health or to manage ailments that are readily self-recognizable. This paradigm includes the use of non-prescription products to treat common health conditions or symptoms without the need for medical supervision, as well as using products to maintain health, whether self-initiated or following physician recommendations. While the two approaches to self-care can be differentiated along these lines, this paper examines the economic value of both approaches under the broader self-care banner. Examples of conditions and symptoms suitable for self-care include chronic pain, allergies, migraine, skin conditions, fungal infections, cold symptoms, fever control, heartburn, and dyspepsia^{1,2}. Self-care can also be important as part of preventative medicine, for example in smoking cessation and in the prevention of heart disease³.

There are a number of potential benefits of self-care, including increased access to effective treatment, a reduction in the number of visits to physicians (thereby alleviating pressure on healthcare services), increased productivity of the population, increased patient autonomy and reduced

costs to third-party payers, such as government or insurance companies. The potential disadvantages of self-care, such as postponement of seeking care or incorrect diagnosis, unsupervised use increasing the risk for misuse, abuse, over-dosage, adverse events, or interactions with other medications or consumables (all of which could add to the cost of self-care), have been described elsewhere^{4–6}. This review is principally focused on two aspects of self-care: improved patient access to treatments and the cost-related impacts of self-care in terms of healthcare resource use, medication costs, and employee productivity. Improved patient access to healthcare, whether physician services or pharmaceuticals, has consistently been shown to improve outcomes^{4,7,8}. Responsible self-care represents a significant form of healthcare access, as patients have the ability to obtain medications with limited or no supervision by a healthcare professional. Patients have the potential to learn about the treatments that are available to them without a prescription and either manage their own health or, if they have questions, bring those questions to a physician or pharmacist for advice and guidance. Thus, the use of self-care empowers the patient to decide what is best, or take advantage of the

healthcare shared decision-making model, if the patient decides that it is needed.

The cost savings associated with self-care are beneficial to the patient, the healthcare system, and the broader economy. As the world's population ages, healthcare systems are becoming increasingly concerned with cost containment⁹⁻¹³. Self-care reduces the need for clinic visits, thereby making more physician time available that can be directed to more urgent or severe cases. In healthcare systems that have waiting lists for physician visits and procedures, self-care allows many common conditions to be managed without time spent in a formal healthcare setting¹⁴⁻¹⁶. Avoiding physician visits can also benefit the patient directly in terms of cost savings (if patients are required to pay for primary care visits, such as in the US where most patients have a co-payment of USD 25 or less), time saved, and improved workplace productivity. Even when there is no payment by the patient for prescriptions or doctor visits, there are certainly opportunity-cost savings associated with not having to travel to a physician clinic for an appointment and potentially missing work (i.e. for patients without flexible working arrangements who are unable to schedule doctor's visits outside of normal working hours); productivity may be increased if patients are empowered to manage symptoms and conditions through effective self-care (e.g. in terms of pain management, allergy relief) rather than avoid or delay treatment.

However, despite of all the evidence demonstrating the economic benefits of self-care, it is still not used as widely as possible. It has been estimated that, in the US, ~10% of visits to doctors could be avoided by the use of appropriate self-care, and avoiding even half of those unnecessary visits would save up to USD 5.2 billion annually¹⁷. Debate remains regarding which drugs/formulations should be available, how accessible these products should be, how much self-medication use is inappropriate or wasteful, and the exact cost savings associated with self-care. We conducted a targeted literature analysis to identify the evidence that is currently available on the economic value of self-care in terms of the economic value associated with changing the status of medication(s) from prescription only to pharmacy or general sale, and the impact of self-care on patients and healthcare systems in terms of access to treatment, time, and productivity. This review paper summarizes the findings of the literature analysis and the current state of knowledge on the value of self-care worldwide.

Methods

Literature analysis

In a three-phase approach, literature describing the economics of self-care from countries around the world was reviewed. The first phase of the literature review process identified published research, white papers, and unpublished research studies that were received from members of the World Self-Medication Industry (WSMI) across various countries to illustrate research their organizations have developed. In the second phase, additional papers were identified through detailed searches of PubMed, EBSCOhost, and

Google Scholar. Finally, potentially relevant articles were screened in three stages, firstly by title, then by published abstract, and finally the full text of potentially relevant papers was reviewed.

The searches of PubMed, EBSCOhost, and Google Scholar attempted to include all articles pertaining to the economics of self-care, including studies that evaluated the costs of non-prescription medicines alone and in combination with prescription drugs, and the (hypothetical or real-world) cost of reclassifying a specific non-prescription therapy or set of therapies to prescription-only status and vice versa (Appendix 1). The timeframe of the literature search was limited to articles published after 1990. Initially, all articles that evaluated the economics of self-care were identified; after this stage, separate searches were conducted for specific drug classes known to have been re-classified as non-prescription products, including proton pump inhibitors, weight loss drugs, nicotine therapy, anti-histamines, and heartburn medications (Appendix 1). Overall, 71 published papers, online reports, and presentations were reviewed, from which 17 articles were selected for inclusion in the literature analysis (Appendix 2). Of these, 11 articles were based on modeling studies, and six described retrospective data studies. This review describes the main findings of these papers, focusing on information relating to costs and healthcare utilization associated with conditions suitable for self-care.

Evaluating the economics of self-care: types of research studies

The economic impact of self-care is a complex area to study due to the wide range of value drivers including patient factors, healthcare resource usage and systems, medication types and usage, different perspectives of cost (e.g. for patients, physicians, governments, or third-party insurers), as well as the wide range of diseases and conditions potentially affected. Research in this area of health economics is based on:

- retrospective analysis of existing data from medical records, retail sales data, registries, medical claims databases (e.g. burden of illness studies, cost-effectiveness analyses),
- modeling of potential economic outcomes using retrospective data as inputs, or
- prospective data from patient surveys, expert panels, patient interviews, or prospective registries

Each of these research methodologies are suited to different study goals; modeling studies attempt to predict future scenarios using mathematical models based on (a) the impact of a past change in medication status/availability for which data is available or (b) trying to understand the widespread impact of a change that has been implemented. Retrospective studies attempt to understand the historical state or burden of a condition, drug, or group of people. Prospective data is used to help assess the direct impact of a change or intervention either historical or current via a variety of methods.

The published data identified in this literature review of the value of self-care were derived from either modeling studies that used retrospective data, from retrospective studies that analyzed outcomes from changes in medication status from prescription only to non-prescription (or vice versa), or from studies assessing utilization based on existing availability. Some studies evaluated the impact of non-prescription medication use in a single therapy area (e.g. non-sedating antihistamines) while others took a broader view and evaluated the impact of self-care across a grouped set of conditions for which non-prescription medications could potentially become available.

Results

Evidence of the economic impact of self-care from modeling studies

Analysis of the impact of grouped conditions suitable for self-care

A report from the Center for Workforce Health and Performance (CWHP) in the US analyzed data on absences from work (absenteeism), lower job performance (presenteeism), and lost productivity costs associated with the management of 26 chronic conditions using the Integrated Benefits Institute (IBI) Full Cost estimator modeling tool¹⁸. The Health and Work Performance Select database was also used to evaluate and present the patient self-reported prevalence and treatment rates for each of these conditions. The CWHP report estimated that the group of 26 chronic conditions identified (Table 1) accounts for ~USD 165 billion annually in lost-productivity costs in the US. It was reported that ~76% of all employees have at least one chronic health condition, but that on average only 28% of employees' chronic conditions are being treated overall. Of the 26 conditions that were identified, 12 have an FDA-approved non-prescription drug available. Those 12 conditions have self-reported treatment rates that range from 15–39% (Figure 1) and net lost-productivity costs that range from USD 3.4 billion to USD 44.9 billion (Table 1). The conditions that were associated with the highest net lost-productivity costs and the greatest number of lost-work days include allergies/hay fever (USD 44.9 billion, 130.9 days), chronic back/neck pain (USD 42.4

billion, 128.1 days), and heartburn/gastro-esophageal reflux disease (USD 30.5 billion, 92.6 days)¹⁸. While this report highlights the costs and productivity losses associated with not using self-care options, it is important to note that these data are self-reported, introducing the potential for errors or biases associated with an individual's memory. Furthermore, self-care interventions may potentially increase the total cost of care with additional expenses should a patient's condition worsen while attempting to treat with self-medication.

Another modeling study that analyzed the impact of non-prescription medications in the US was published by the Consumer Healthcare Products Association (CHPA) in 2012¹. The CHPA report estimated that the availability of non-prescription medications provides USD 102 billion of value to the US healthcare system each year, with each dollar spent on a non-prescription medication saving the US healthcare system USD 6–7. This study calculated that 240 million of the US population use non-prescription products for self-care and that, of these, 60 million people would not seek out alternative treatments if their medication was only available by prescription.

In Europe, a modeling study from the Association of the European Self-Medication Industry (AESGP) also reported that self-care through responsible self-medication can significantly reduce national healthcare costs³. An analysis of data from seven European countries led to the estimation that moving 5% of prescribed medications to non-prescription status would result in total annual savings of more than EUR 16 billion, highlighting the potential that self-care has to alleviate some of the financial burden on European healthcare systems³.

An Australian study jointly funded by the Macquarie University Centre for the Health Economy (MUCHE) and the Australian Self-Medication Industry (ASMI) evaluated the economic value of non-prescription medication to the Australian healthcare system¹⁹. This study surveyed the attitudes and behaviors of 1,146 adult Australians regarding non-prescription and prescription-only drugs. In a hypothetical scenario in which eight categories of common self-care products were switched to prescription status, 52–70% of respondents would choose to visit a doctor in order to continue to have access to their chosen medication. Thus, it was estimated that the hypothetical switch would cost AUD 3.8 billion in

Table 1. Estimated absenteeism and presenteeism costs by chronic condition in the US workforce in 2016¹.

Condition or symptom	People with condition (%) ^a	Average number of other conditions ^a	Net lost workdays through absence and presenteeism (millions) ^b	Net lost-productivity costs (USD billions) ^b
Allergies/hay fever	39.5	3.0	130.9	44.9
Chronic back/neck pain	14.3	4.9	128.1	42.4
Heartburn/GERD	13.6	4.6	92.6	30.5
Obesity	11.1	4.6	92.1	31.6
Chronic sleeping problems	6.5	5.7	89.8	30.0
Chronic pain	5.6	6.1	60.6	20.0
Arthritis	13.5	4.6	57.4	19.7
Irritable bowel disorder	6.0	5.3	56.7	18.9
Headaches	8.9	5.1	53.3	19.1
Migraine	8.9	4.8	48.8	16.7
Urinary/bladder problems	4.0	5.4	33.8	11.2
Ulcer	2.0	6.0	9.9	3.4

^aAmong workers with condition.

^bCompared with employees with condition.

Abbreviation. GERD, gastroesophageal reflux disease.

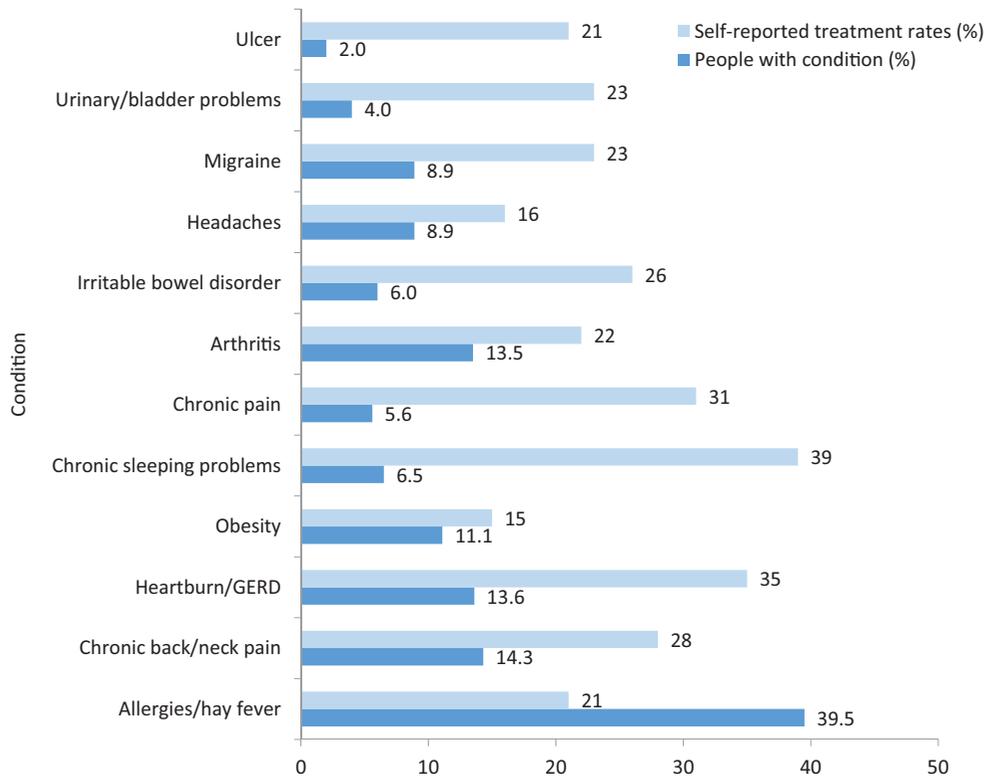


Figure 1. CHWP self-reported treatment rates for conditions with FDA-approved non-prescription medications in the US workforce¹⁸. Abbreviations. CHWP, Center for Workforce Health and Performance; FDA, US Food and Drug Administration; GERD, gastroesophageal reflux disease.

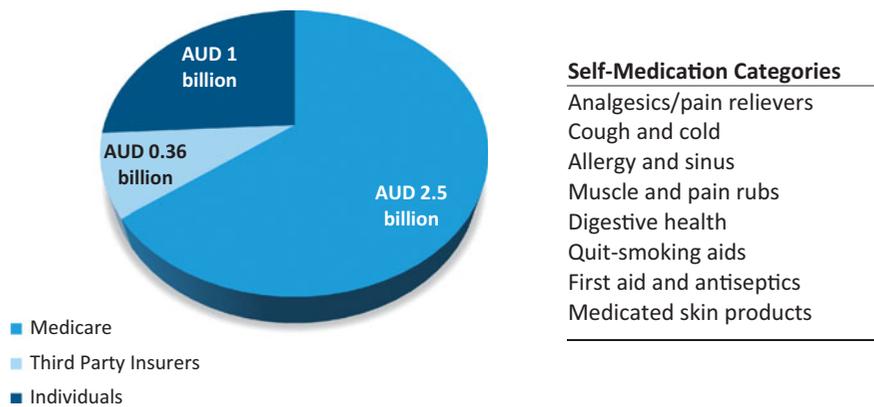


Figure 2. Estimated increases in cost to the Australian healthcare system associated with eight categories of non-prescription medications being switched to prescription only status (2014)¹⁹.

doctor's visits, of which Medicare would pay out an additional AUD 2.5 billion, health insurers AUD 360 million, and individuals AUD 1 billion (Figure 2)¹⁹. These costs were predicted to increase to more than AUD 10 billion per year if the indirect costs of doctor appointments were considered, such as time traveling to and from the clinic, and the impact that taking time off work to see a doctor would have on productivity¹⁹. The same group also modeled a separate scenario in which 11 categories of common prescription drugs (including erectile dysfunction drugs, stomach acid-reducing agents and weight-control products, among others) were re-classified to non-prescription status; in this scenario, it was estimated that Medicare would save AUD 730 million, health insurance AUD 110 million, and individuals AUD 300 million¹⁹. Further supporting this evidence was a report by

Shanahan and de Lorimier²⁰, which showed that a number of self-care products (i.e. vitamin D, calcium and magnesium supplements, folic acid, B6, B12 and omega-3 supplements, lutein and zeaxanthin, St John's wort) as a preventative regimen in osteoporosis, osteopenia, cardiovascular disease (CVD), and other age-related diseases resulted in notable reductions in healthcare costs and improvements in productivity in specific high-risk adult populations.

Impact of self-care in specific therapy areas

Allergic rhinitis and chronic urticaria

Non-sedating anti-histamines are used globally to treat histamine-related conditions including allergic rhinitis and chronic urticaria. Two generations of non-sedating anti-histamines

have now widely been re-classified from prescription only to non-prescription status, and the impact of this re-classification was modeled in Canada using a decision model developed by the Queen's Health Policy Center²¹. The model calculated the consumer surplus (in terms of monetary and time benefits) that would be provided if non-sedating anti-histamines were available without prescription. It was estimated that, for every CAD 1 spent by consumers on non-sedating anti-histamines, CAD 1.13–1.24 was received in benefits, depending on the model run. On a national level this equated to CAD 8.1–14.9 million in 1994 CAD, or CAD 12.2–22.4 million in 2016 CAD (costs were adjusted to 2016 CAD using the medical care component of the consumer price index²²). The opportunity cost savings associated with not having to see a physician for a non-sedating anti-histamine prescription was estimated at CAD 4.4 million in 1994 CAD or CAD 6.6 million in 2016 CAD. Sensitivity analyses showed that the average prescription cost would equal that of self-care with non-sedating anti-histamines only when estimates are varied around physician services (all costing CAD 16.25, no follow-ups), pharmacist fees (CAD 10, no follow-ups), doubling costs of concomitant medication, and assuming only half the number of people going to a physician would not have otherwise done so.

Similarly, in a modeling study reported by Sullivan *et al.*²³, the cost-effectiveness of re-classifying second-generation anti-histamines from prescription only to non-prescription availability was estimated in the US. This model included indirect savings that would occur due to the avoidance of car accidents and other injuries associated with the sedating effects of first-generation anti-histamines. The study showed that the transition to self-care with second generation non-sedating anti-histamines would save USD 100 per individual with allergic rhinitis or ~USD 4 billion annually in the US²³. When the additional savings associated with lost work productivity were included, an additional USD 854 million contributed to the total economic impact of ~USD 4.85 billion associated with a switch to non-prescription status²³.

Heartburn/non-ulcer dyspepsia

A variety of heartburn medications are available for self-care, but there are few studies evaluating the costs and benefits of these medicines. Mansfield and Callahan²⁴ conducted a study to quantify cost savings associated with non-prescription use for heartburn. The first part of the study showed that patients taking prescription heartburn drugs visited their doctor to discuss symptoms 1.62 more times than patients using a non-prescription product, and it was determined that, if patients were not taking non-prescription heartburn medications, physician appointments would amount to ~6 million visits. At a rate of USD 121 per physician visit, an increase of 6 million appointments would amount to ~USD 757 million in healthcare costs. From the patient perspective, self-care provides an approximate annual saving of USD 174 and USD 160 in physician visits and medications, respectively²⁴.

A study of the Canadian marketplace by Tasch *et al.*²⁵ utilized a model that predicted cost differences in the treatment

of patients with heartburn/non-ulcer dyspepsia if famotidine, a H2 receptor antagonist, was switched to non-prescription status. Tasch *et al.*²⁵ predicted that costs to a third-party payer, such as the provincial governments, would decrease by CAD 6 per user if famotidine was available without a prescription, although costs were sensitive to the proportion of patients who initially chose to consult a doctor rather than self-medicate, and to the percentage of patients who achieved successful symptom relief when self-medicating. Medications may have different restrictions in different countries. Proton pump inhibitors, which are among the most commonly used drugs in the world, are available in the US in both prescription and over-the-counter formulations to relieve heartburn, but only the prescription doses are used for the treatment of peptic ulcers or gastroesophageal reflux disease. In other countries, for example the UK, over-the-counter proton pump inhibitors can be used for the treatment of all three conditions, but only for a limited amount of time.

Common cold: symptom management

Colds are the most common illness in children and adults alike, and, while symptoms resolve in 7–10 days, the symptoms, particularly the cough, are unpleasant and can result in lost work productivity²⁶. Patients in the US spend ~USD 2 billion per year on self-care products to treat cough symptoms associated with the common cold virus²⁶. Many non-prescription cough medications contain dextromethorphan (DXM) as the active ingredient. Through a cost-minimization analysis, Rankin *et al.*²⁶ evaluated the benefits associated with DXM being available for self-care in terms of both avoided physician visits and lower drug prices. This study estimated that, if DXM was available only via prescription, there would be an additional cost to the healthcare system of USD 22–31 billion for the time period of 2016–2025 compared with the scenario in which DXM remains available as a non-prescription medicine²⁶.

Migraine

Migraine is associated with a considerable economic burden both in terms of healthcare costs and lost productivity among sufferers of the condition; the annual cost of migraine has been estimated as at least EUR 27 billion in Europe and USD 16.6 billion in the US²⁷. Migraine-attack management has been reported to be responsible for ~EUR 582 million in overall direct spending each year across six European Union countries (France, UK, Spain, Italy, Germany, and Poland)²⁸. In 2006, two medications for migraine treatment from the triptan class were approved as non-prescription drugs, one in Germany (naratriptan 2.5 mg), and one in the UK (sumatriptan 50 mg). A study that modeled the impact of switching triptans from prescription to non-prescription availability across six EU member states from a third-party payer and societal perspective over a 1-year time period showed that an estimated EUR 75 million in third-party payer savings (12.9% of the total direct spending on migraine management) would be achieved after only 1 year of triptan non-

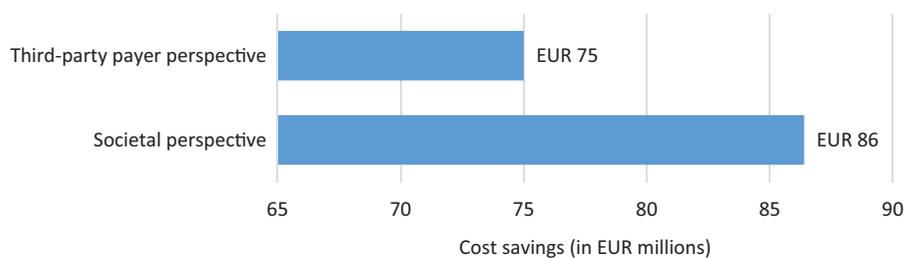


Figure 3. Estimated annual cost savings from a switch in the triptan class of migraine medication from prescription only to non-prescription status across six EU member states (France, UK, Spain, Italy, Germany, and Poland)²⁸.

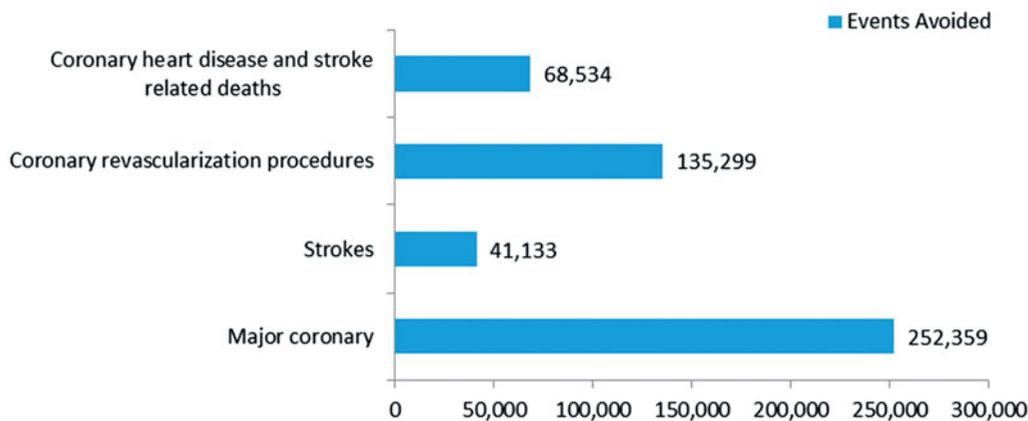


Figure 4. Predicted number of cardiovascular events that could be avoided over a 10-year period if a non-prescription statin drug was available³¹.

prescription availability, assuming 20% of patients switch to self-care²⁸. From a societal perspective, total cost savings amounted to EUR 86 million annually (Figure 3). Followed by drug acquisition costs, the largest savings following the switch were due to general practitioner (GP) visits avoided, decreases in productivity loss due to GP visits, and a reduction in time off work. As some EU member states, such as Poland, did not reimburse triptans in 2013, a significant benefit would result from switching from prescription to non-prescription status. Other important considerations in favor of non-prescription status for triptans are that early access to effective migraine treatment may prevent an attack from progressing, improve outcomes, enhance productivity, lower drug prices, and avoid GP and/or emergency room visits²⁸.

Cardiovascular disease

It is well accepted that treatment with statins can reduce the incidence of heart disease and stroke, as well as reduce mortality in heart disease and stroke patients²⁹. However, 45% of patients who meet the criteria for treatment with statins are still not receiving them³⁰. Given that statins have been described as one of the most successful prescription drugs and have the potential to increase savings tremendously if re-classified to non-prescription availability, Stomberg *et al.*³¹ developed a model to estimate the costs and benefits of self-care with a non-prescription statin in the US from a healthcare-system perspective using the 2013 American College of Cardiology/American Heart Association guidelines. Over a 10-year time period it was estimated that the use of

non-prescription statins would lead to the avoidance of 252,359 major coronary events, 41,133 strokes, and 135,299 coronary re-vascularization procedures, as well as preventing 68,534 coronary heart-disease and stroke-related deaths (Figure 4). Avoiding these events was estimated to result in healthcare-resource savings of USD 10.8 billion, while the cost of drug therapy would increase by USD 28.3 billion, leading to a net increase in total costs of USD 12.6 billion. This translates to less than USD 200,000 per death avoided by using non-prescription statins. The authors of the study concluded that the availability of non-prescription statins, with appropriate labeling and patient education, should provide a cost-effective approach to CVD prevention³¹.

In addition to statins, the value of omega-3 supplements—which are available without prescription—has been studied in the prevention of CVD³². Clinical trials and other scientific literature have found a correlation between high-strength omega-3 eicosapentaenoic acid (EPA) + docosahexaenoic acid (DHA) supplements and reductions in CVD events³². A literature analysis published as part of a European study evaluating changes in relative risk and costs with the use of omega-3 EPA + DHA showed that the relative risk is reduced by, on average, 4.9% in an individual CVD patient when taking 1,000 mg/day of omega-3 EPA + DHA. When this risk reduction was extrapolated into the number of potentially avoided hospital events over a 5-year time horizon it was shown that 1.5 million hospital events could be avoided in adults in the EU aged 55 years and older. Furthermore, if it is assumed that 100% of the EU population that is aged 55 years and over is taking omega-3 EPA + DHA, the avoidable costs would amount to EUR 12.9 billion

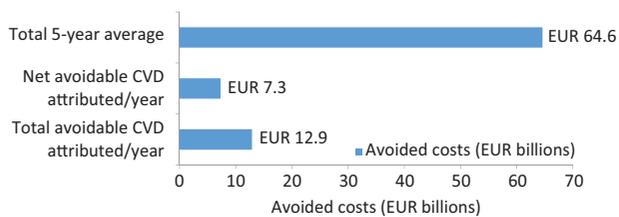


Figure 5. Predicted cost savings (EUR billions) if all residents in the European Union aged 55 years and older took a 1,000 mg/day supplement of omega-3 eicosapentaenoic acid + docosahexaenoic acid³². Abbreviation. CVD, cardiovascular disease.

total CVD-attributed costs/year or EUR 7.3 billion net CVD-attributed costs/year. Therefore, for every EUR 1 spent on a daily 1,000 mg regimen of omega 3 EPA + DHA it was predicted that consumers would see a EUR 2.29 return on investment. The report estimated that, for the entire EU population 55 years of age or older, self-care with omega-3 products would save, on average, more than EUR 64.6 billion over 5 years (Figure 5)³².

Evidence of the economic impact of self-care from retrospective data analyses

The potential value of self-care in the management of chronic health conditions

In the UK, a study of data from the IMS Health Disease Analyzer database identified the number of visits to GPs that were associated with conditions suitable for self-care³³. As a de-identified patient records database that includes data on diagnosis, prescription, admission, and referrals, the IMS Health Disease Analyzer allows researchers to designate physician visits by patient condition. In the years 2006 and 2007, there were 57 million physician visits per year for conditions that were appropriate for self-care, of which 51.4 million visits were made solely for the purpose of seeking treatment for these conditions. To place this number in context, the total number of physician visits during that time period was 290 million, meaning 20% of the total number of visits involved conditions suitable for self-care, and 18% of consultations were solely for such conditions³³. Of note, 91% of the doctor consultations involving these conditions resulted in the writing of prescriptions, resulting in a cost of GBP 370 million. When the cost of physician time is included in the calculation, ~GBP 2 billion is spent annually in treating these conditions. The conditions suitable for self-care for which patients consulted their GP included colds, indigestion, and muscle aches, all of which could be reasonably treated with non-prescription medications.

In the US, Collins *et al.*³⁴ published a study that assessed the impact of chronic health conditions on work performance, absence and total economic impact for employers through a two-part analysis. In part one, full-time employees of the Dow Chemical Company completed an online health survey. Based on survey results from 7,797 respondents, the most frequently reported primary health conditions (the condition that affected respondent most in the past 4 weeks) were allergies (18.9%), arthritis/joint pain or stiffness (9.0%),

heart or circulatory problems (7.1%), and back/neck disorders (7.0%). Self-reported absenteeism and work impairment during the past 4-week period varied from 0.9–5.9 h and 17.8–36.4%, respectively. Self-care offers effective treatment for many of these chronic conditions.

Evidence for the economic impact of self-care on different conditions

Vaginitis

An analysis of the impact of the re-classification of vaginal anti-fungal products was completed by the Fallon Community Health Plan (FCHP) in 1992³⁵. FCHP is an integrated delivery network that provides healthcare services including inpatient and outpatient care, as well as health insurance, to patients. In the 1 year following the switch of vaginal anti-fungal products to non-prescription status, the FCHP recorded a reduction in physician visits by female plan members of 0.66 per 100 members, equivalent to cost savings of USD 12,768–USD 25,729, depending on the degree of laboratory testing used during patient evaluations³⁵. In addition, direct medication costs were reduced by USD 42,528 in the 1-year period after the switch, a considerable saving for the FCHP.

Pain

Self-care with non-prescription topical and systemic drugs (e.g. paracetamol, ibuprofen, and ibuprofen topical products) has an important role in pain management, albeit only for occasional use (chronic pain should be managed by prescription drugs only). The literature analysis identified a retrospective, cross-sectional study by Lee *et al.*³⁶ presented at the International Society for Pharmacoeconomics and Outcomes Research in 2016 evaluating National Health and Welfare Survey data in 2013. Of 75,000 patients surveyed, 25,851 respondents (34.5%) had reported pain in the past 12 months, of whom 15.1% were taking non-prescription medicine plus a prescription drug, 19.0% used a prescription drug only, 51.3% took a non-prescription medicine only, and 14.6% were untreated. Non-prescription product use was associated with significantly less work impairment compared with untreated patients (18.2% vs 20.1%; $p = .0046$) and less activity impairment (25.5% vs 27.1%, respectively; $p = .0006$) (Figure 6). Similar trends were seen in activity impairment compared with the prescription only group (42.8% vs 46.1%; $p = .0002$). In the previous 6 months, respondents taking a non-prescription medicine only experienced fewer hospitalizations than untreated patients (0.09 vs 0.13; $p < .0001$).

Common cold: symptomatic treatments

An analysis by Temin *et al.*³⁷ used data from IMS Health to evaluate the impact of the switch of many cough and cold medicines from prescription to non-prescription status between 1976 and 1989 in the US. The study identified that the number of physician visits related to common colds fell by ~110,000 per year in this 14-year period. In the final year of analysis, there were 1.65 million fewer doctor visits and, as

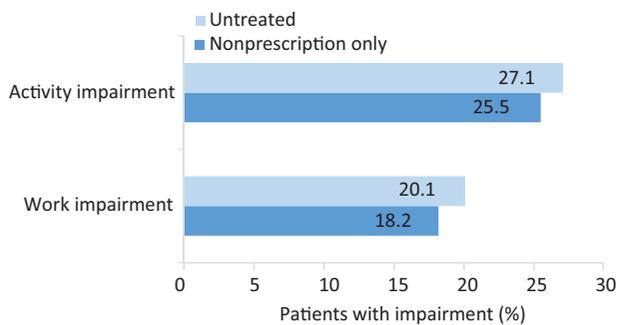


Figure 6. The impact of non-prescription pain medications on activity and work impairment in the US (data from the National Health and Welfare Survey 2013 data)³⁶.

the cost of a visit in 1989 was estimated as USD 42 (USD 30 fee plus USD 2 for public transportation and USD 10 for an hour of a patient's time), the reduced visits equated to savings of USD 70 million³⁷. As this analysis was published in 1992, it can be assumed that the costs associated with the physician visit would now be notably higher, but even assuming the cost was still USD 42 per consultation, yearly savings of USD 70 million in 1992 are equivalent to USD 120.2 million per year in 2016³⁷. Costs were adjusted to 2016 USD using the medical-care component of the consumer price index²².

Discussion

This literature review of the benefits of self-care has identified many studies—modeling studies and other retrospective data analyses from around the world—that highlight the potential for self-care to substantially reduce healthcare costs. Studies have analyzed the potential economic value of self-care across grouped conditions, as well as analyzing the impact of switching from prescription to non-prescription status in specific conditions including allergic rhinitis/chronic urticaria, cold, migraine, CVD, heartburn, vaginitis, and pain. The first clear finding from the published evidence is that a significant reduction in physician visits is observed when a class of drugs becomes available without prescription. This is of benefit to patients as they have improved access to cost-effective treatment without the need for a physician visit. Moreover, the studies included in this report have shown that a large proportion of patients seek medical care from a doctor for conditions that are suitable for self-care, resulting in a high proportion of unnecessary physician visits. If patient education could address this issue and increase the number of patients using self-care appropriately, then this would have huge potential value to society. As nearly every healthcare system around the world is dealing with limited resources and lengthy wait times, reducing the number of physician visits for conditions that can be self-managed has benefits that extend beyond these conditions, because more resources become available for the management of other potentially more serious or complex conditions.

The second key finding from our review pertains to the cost savings that a re-classification from prescription to non-prescription status can mean for government or third-party

payers. Not surprisingly, availability of health products for self-care results in a reduction in costs borne by the payer with a shift of medication costs to the individual consumers, in this case, the patients. Part of this cost decrease may be associated with the reduction in physician visits if the GPs are not salaried employees. Other cost savings come in the form of reductions in prescription costs, and if the payer is a third-party entity there can be reductions in pharmacy cost. If the payer is a government that sets standard rates for prescriptions, the switch to non-prescription status means that there are fewer drugs to have on reimbursed formularies. The health economic studies identified in this review show that the availability of self-care medicines provides USD 102 billion in value to the US healthcare system annually¹. If self-care medicines were not available, additional emergency department visits, primarily by patients on Medicaid and uninsured individuals, would drive up nearly USD 4 billion in healthcare system costs each year¹.

The studies we reviewed have also highlighted other implications of a switch to self-care status, such as reductions in patient time burden, improved quality-of-life, and better workplace productivity. These effects are usually studied in tandem with other implications such as the two discussed above, but the benefit they present is still important. These effects are more tangible to the patients and their employers than the wider cost benefits to healthcare systems, and many patients can readily recognize the benefits of the increasing availability of products intended for self-care in their everyday lives (e.g. in the management of non-ulcer dyspepsia, heartburn, vaginitis, allergies). Now that patient centeredness and advocacy is at the forefront of medical care discussions around the world, patient views on these issues can be expected to move from their status as secondary healthcare considerations to a more primary focus.

In terms of the value of self-care, there is still much research that needs to be done to expand on the current platform of evidence supporting the value of these products to healthcare. More research is needed in terms of the impact of self-care on patient burden, and productivity differences between self-care and the use of prescription drugs, but additional attention is also needed in two other areas. More targeted research is required, firstly to identify the most commonly used non-prescription products for self-care and, secondly, to determine a systematic process for performing research studies on conditions amenable to self-care. There is a wealth of studies on these aspects, but these were not the focus of the current targeted literature review.

Research analysis on the value of self-care is limited. For example, in the US the weight-loss agent orlistat has received very little attention outside of an opinion article, even though there is a large market, substantial media attention on obesity control, and a proven need for effective medication. Further, commonly used non-prescription products that have been on the market for many years or even decades have not been extensively examined for their economic value. These compounds include rehydration salts for dehydration associated with acute diarrhea and vomiting, anti-diarrhea tablets and other heartburn medications (e.g. antacids, alginates), among others. Research studies evaluating the health economic value

of medicine in more therapeutic categories would be beneficial to further understanding the totality of the value proposition for self-care.

Finally, it is important to note that the conditions for which self-care products are currently available vary significantly from country to country. Moreover, the economic conditions, healthcare systems, and societal perspectives differ by region and nation. Such differences must be borne in mind when extrapolating the findings of health economic data such as those we have identified in this review, and national studies of self-care impacts should be carried out wherever feasible.

Conclusion

Although political and regional differences are inevitable, and more evidence is clearly needed to support the value of self-care, it is clear that improving access to health products that people can use to manage their own health can deliver significant economic benefits for overstretched healthcare systems worldwide.

Transparency

Declaration of funding

Funding was provided by the World Self-Medication Industry.

Declaration of financial/other interests

CMB and JN are employees of Precision Health Economics, a contract research organization. CMB has also received grant funding and/or consulting support from United Therapeutics, Grifols, Teva, and Novartis. Peer reviewers on this manuscript have received an honorarium from JME for their review work, but have no other relevant financial relationships to disclose.

Acknowledgments

The authors gratefully acknowledge David Skinner at Heuristix for his contributions to this manuscript. Tessa Hartog, PhD, of Excerpta Medica, funded by Sanofi US, Inc., provided writing/editorial support during the preparation of this manuscript.

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Appendix 1: Search strategy used

Terms used	Databases used	Search round ^a
Self-medication AND Cost OR Benefit OR Economic	PubMed, Ebscohost, Google Scholar	1
OTC AND Cost OR Benefit OR Economic	PubMed, Ebscohost, Google Scholar	1
OTC and Cost OR Benefit OR Economic	PubMed, Ebscohost, Google Scholar	1
Prescription to OTC switch	PubMed, Ebscohost, Google Scholar	1
Self-medication AND Research	PubMed, Ebscohost, Google Scholar	1
Over the counter AND Research	PubMed, Ebscohost, Google Scholar	1
OTC AND Research	PubMed, Ebscohost, Google Scholar	1
Self-medication AND Economic model	PubMed, Ebscohost, Google Scholar	1
Over the counter AND Economic model	PubMed, Ebscohost, Google Scholar	1
OTC AND Economic model	PubMed, Ebscohost, Google Scholar	1
Self-medication AND Antihistamine OR Orlistat OR Statin OR Nicotine	PubMed, Ebscohost, Google Scholar	2
OTC AND Antihistamine OR Orlistat OR Statin OR Nicotine	PubMed, Ebscohost, Google Scholar	2
OTC AND Antihistamine OR Orlistat OR Statin OR Nicotine	PubMed, Ebscohost, Google Scholar	2

^aIn round one we were looking for specific countries; then we expanded to any country. In round two we began looking for specific treatment areas where prescriptions have been transitioned previously. This excludes articles found in the references of other articles as well as information sent from member countries. Abbreviation. OTC, over the counter.

Appendix 2: Synopsis of articles included in the literature analysis

Reference (year)	Design	Condition suitable for self-medication	Main finding
MUCHE ¹⁹ (2014)	Model	Grouped	Moving 8 categories of non-prescription medications back to prescription status would cost the Australian healthcare system an additional AUD 2.5 billion.
Shanahan and de Lorimier ²⁰ (2014)	Model	Grouped	Adoptions of complementary medicine treating osteoporosis, osteopenia, cardiovascular disease, age-related macular degeneration and moderate major depression resulted in notable reductions in healthcare costs and improvements in productivity.
Center for Workforce Health and Performance ¹⁸ (2016)	Model	Grouped	Chronic conditions account for ~USD 165 billion annually in lost productivity costs in the US, and only 28%, of employee's conditions, on average, are treated overall.
Anderson <i>et al.</i> ²¹ (1995)	Model	Allergic rhinitis/Chronic urticaria	Canada benefits CAD 1.13–1.24 for every CAD 1 spent on non-sedating anti-histamines.

(continued)

Continued			
Reference (year)	Design	Condition suitable for self-medication	Main finding
Tasch <i>et al.</i> ²⁵ (1996)	Model	Heartburn/Non-ulcer dyspepsia	Cost savings of CAD 6 per user would be made if Famotidine became available as a non-prescription product.
Sullivan <i>et al.</i> ²³ (2003)	Model	Allergic Rhinitis/Chronic urticaria	Second-generation anti-histamines save USD 4 billion and prevent 449 deaths.
Rankin <i>et al.</i> ²⁶ (2016)	Model	Cold	In a hypothetical scenario, wherein dextromethorphan is moved to prescription status only, access would cost an additional USD 22–31 billion during 2016–2025.
Millier <i>et al.</i> ²⁸ (2013)	Model	Migraine	Across six EU-member countries, moving two triptans to non-prescription availability would save EUR 75 million.
Stomberg <i>et al.</i> ³¹ (2016)	Model	Cardiovascular disease	If statins were non-prescription in the US, it would save USD 10.8 billion.
Shanahan ³² (2016)	Model	Cardiovascular disease	Non-prescription omega-3 acids save EUR 2.29 per EUR 1 spent on the compounds.
Mansfield and Callahan ²⁴ (2008)	Model	Heartburn	If heartburn medications were not non-prescription it would cost third-party payers an extra USD 757 million in total costs.
PAGB ³³ (2007)	Retrospective	Grouped	If treatments for conditions suitable for self-medication were made available as non-prescription medicines it would save GBP 2 billion annually.
Collins <i>et al.</i> ³⁴ (2005)	Retrospective with a prospective component	Grouped	Based on survey results from 7,797 respondents evaluating chronic conditions, employees with depression, anxiety, or emotional disorders (36.4% decrement), or breathing disorders (23.8% decrement) had the greatest work impairment and absences.
Gurwitz <i>et al.</i> ³⁵ (1992)	Retrospective	Vaginitis	For one integrated-delivery network, savings associated with vaginal anti-fungal treatments being available as non-prescription medicines were between USD 94,926 and USD 117,176.
Lee <i>et al.</i> ³⁶ (2016)	Retrospective	Pain	Opioids in combination with non-prescription products for patients experiencing pain improved activity impairment and pain intensity, and reduced healthcare resource use.
Lee <i>et al.</i> ³⁶ (2016)	Retrospective	Pain	Of 25,851 respondents reporting pain in the 2013 National Health and Welfare Survey database, 14.6% were untreated, 51.3% were non-prescription only, 19% were prescription only, and 15.1% used a combination of non-prescription and prescription. Those taking non-prescription products showed improvements in resource use, presenteeism, and work/activity impairment when compared with other groups (results were not consistent across the board, but this was the general consensus).
Temin ³⁷ (1992)	Retrospective	Cold	Non-prescription cold medicines reduced physician visits by 1.65 million in a year, saving between USD 70 million and USD 120 million.