



# Effective healthcare cost-containment policies: A systematic review

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## ABSTRACT

Unsustainable growth in healthcare expenditure demands effective cost-containment policies. We review policy effectiveness using total payer expenditure as primary outcome measure. We included all OECD member states from 1970 onward. After a rigorous quality appraisal, we included 43 original studies and 18 systematic reviews that cover 341 studies. Policies most often evaluated were payment reforms (10 studies), managed care (8 studies) and cost sharing (6 studies). Despite the importance of this topic, for many widely-used policies very limited evidence is available on their effectiveness in containing healthcare costs. We found no evidence for 21 of 41 major groups of cost-containment policies. Furthermore, many evaluations displayed a high risk of bias. Therefore, policies should be more routinely and rigorously evaluated after implementation. The available high-quality evidence suggests that the cost curve may best be bent using a combination of cost sharing, managed care competition, reference pricing, generic substitution and tort reform.

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## 1. Introduction

The share of gross domestic product (GDP) spend on healthcare is increasing in all member countries of the Organisation for Economic Cooperation and Development (OECD), from 4.6% of GDP in 1970 to 9.0% of GDP in 2016 [1]. Despite a temporary slowdown in the growth of healthcare spending during the fiscal crisis, the pace of healthcare growth is again accelerating in many OECD countries [1]. Growth is driven by a combination of factors: ageing populations and work-force, technological advances, changing preferences due to higher incomes, higher wage growth due to lagging productivity growth, and increased coverage [2]. Healthcare expenditure is financed primarily collectively [3]. The capacity to fund further health spending growth through increases in taxes and premiums seems limited [4]. Hence, expanding healthcare budgets may increasingly pressure public spending in other areas, such as education or infrastructure [5]. Furthermore, the healthcare sector is prone to inefficiencies such as unnecessary care, waste in healthcare, unwarranted clinical practice variation, administrative

burdens, fraud and abuse [6]. The combination of the limited capability of both the government and the economy to keep financing high healthcare growth, plus the awareness about the existing inefficiencies in healthcare, provides policymakers with a compelling argument to contain healthcare costs.

Various countries have sought to address high healthcare cost growth through myriad policies [7–9]. Many EU countries, for example, have been experimenting with strict cost containment policies during the fiscal crisis [10]. Salaries were reduced in France and Ireland [11], and Greece likewise implemented policies to cut physician's wages and fees by 25% [12]. Health budgets were reduced in Italy, Spain, Portugal and Ireland, amongst other countries [11]. Latvia and Bulgaria reduced the health budget by over 20% [11]. Although health systems differ, cost-containment policies have been remarkably similar across countries [13]. And while the effects may be context-dependent, still countries could learn from each other's experiences, especially regarding effectiveness [14–16].

A large number of cost containment policies have been identified, targeting all aspects of the health system, such as prices, volumes, supply, demand and market processes [13]. However, the adaptability of the health system may complicate attaining the goal of containing total costs. For example, price reductions may invoke volume increases [17–19], or compensation in other areas [20,21]. Essentially, intervening in market processes may invoke

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**Table 1**  
PICOS inclusion criteria.

Population	Health sectors of OECD countries
Intervention	Implementation of a cost containment policy
Comparator	Comparison over time, between regions or between groups of insured
Outcome	Reduction in level or growth of: <ul style="list-style-type: none"> <li>• Total expenditure</li> <li>• Sector expenditure</li> <li>• Public expenditure</li> <li>• Total health insurance premiums</li> </ul>
Study design	Empirical policy evaluations

adverse behavioural responses [22,23]. Therefore, whether policies are effective in containing total spending remains an empirical query.

To our knowledge, a robust overview of the available evidence is lacking. The few reviews undertaken focus on areas such as pharmaceuticals [24] or hospitals [25], Medicare and Medicaid [26], payment reform [27,28], and efficiency [29]. None of these reviews has systematically appraised the reliability and risk of bias of the included articles. Moreover, most reviews do not assess the evidence from a societal perspective. Instead, most studies in this field take either a patient or provider perspective. Patient level policies may reduce patient treatment cost, but may forego the provider response to use the access capacity for additional care for other patient groups. Similarly, provider level policies (e.g. hospitals implementing policies to reduce their operating costs) may fail to incorporate additional burdens that may fall on primary care providers or other hospitals [30]. From a provider or patient perspective, reductions in treatment costs may increase efficiency, but due to possible spillovers to other sectors, providers or patients, the effect on total expenditure is ambiguous [31]. This review takes a societal perspective, focusing on expenditures of all payers and patients. The aim of this review is threefold: (1) to summarise existing literature on the effectiveness of healthcare cost-containment policies; (2) to identify knowledge gaps; and (3) to inform policy-makers on promising cost-containment policies.

## 2. Materials and methods

We performed a systematic review to identify evidence on the effectiveness of known policy options to control payer expenditure. Our approach follows the Centre for Reviews and Dissemination guidance protocol for undertaking reviews in healthcare [32]. Standard rapid review procedures were followed with respect to handsearching journals, expert consultations and article translations [33]. Inclusion criteria are defined according to the Patient, Intervention, Comparator, Outcome, Study design (PICOS) framework (Table 1) [34].

Our primary outcome measure is total expenditures, covering all payers, health sectors and patient out-of-pocket payments. Expenditures of individual payers, such as governments (in National Health Service systems), healthcare insurers (in Social Health Insurance systems) or governmental organisations like Medicare and Medicaid, are also included as outcome, although this inclusion contains the risk of cost shifting to other payers or private spending. Furthermore, sector expenditures, e.g. pharmaceutical spending, are included as outcome, although this risks cost shifting to other sectors. Therefore, from a societal perspective these outcome measures may be less reliable than total expenditures. Single hospital expenditures or single patient group expenditures are excluded as outcome measures due to the very high risk of cost shifting.

Effective cost containment is defined as lower total expenditure or payer expenditure compared to a control group, including before–after comparisons within the same population and comparison to a similar population (e.g. insured population of insurers, regions or countries) [35]. Our study population is defined as the insured population (enrolees) of one or more payers, either private or public. This excludes studies using per patient expenditure, per provider expenditure, volumes or prices as sole outcome measure. Containing the cost per unit of service, i.e. improving efficiency [29], is policy relevant as well, but beyond the scope of this review, as are other policy aims such as quality, equity and access. This review only includes OECD countries.

Using inductive pilot searches, relevant keywords were defined for all inclusion criteria. A twofold strategy was employed: a search for cost-containment policies in general and a specific search for individual policies that were identified as cost-containment policies [13]. The final search string (see Appendix A), was amended with database specific glossary terms (MeSH terms). The following databases were searched (June 2016): Pubmed, Medline, The Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science and Econlit. After adding relevant articles from a second cost-containment literature database [13], 7209 unique articles were collected. After excluding irrelevant articles based on title and abstract, 276 articles were screened in full text independently by two researchers. References of the excluded reviews were checked for relevant articles and screened using a similar process as the original articles (see Appendix B for the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram).

We extracted relevant information of the included articles and assessed the quality. To this aim, we reviewed ten quality assessment tools [36–45]. Based on these validated frameworks, we designed a quality assessment tool specifically for policy evaluations (Appendix C). We use five quality domains: content validity, selection bias, confounding bias, measurement bias and reliability. Literature reviews were assessed separately using A Measurement Tool to Assess systematic Reviews (AMSTAR) [46]. The results of the included systematic reviews were incorporated directly in the narrative synthesis without a separate assessment of the papers included in that review [47]. Two reviewers independently performed quality assessments and review assessments.

To structure our results, we use an existing framework of mutually exclusive groups, covering both macro-policies and micro-interventions [13]. Comparing our results with this framework allows detection of knowledge gaps, which may inspire future policy evaluations. Although other categorisations of cost-containment policies exist [48–53], this categorisation was deemed most suitable to detect knowledge gaps.

## 3. Results

In total, 72 policies from 43 empirical papers and 18 systematic reviews were included. The 18 systematic reviews covered a total of 341 studies. Of the 61 included articles, 1 took a societal perspective, while 60 studies took a payer or sector perspective. Overall, the included papers were of mixed quality. Of the 43 empirical papers, 29 articles scored low on at least one of the five quality domains. Systematic review ratings ranged from 3 out of 12 to 12 out of 12 points on the AMSTAR scale. We were unable to perform a meta-analysis due to the methodological heterogeneity and context dependency of the studies [54]. Therefore, results for each intervention are discussed separately. First, we summarise the literature. Next, we identify knowledge gaps. Last, we synthesise the results.

### 3.1. Literature overview

Appendix D summarises our results, structured according to each of the four primary policy groups: budgets, price controls, volume controls and market-oriented policies, where – due to the large number of articles – the last category is further subdivided into market structure policies, market conduct policies and market performance policies. We briefly discuss the findings for each intervention.

#### 3.1.1. Budgets

Budgeting total or sector expenditures is a widespread policy measure [55,56]. Despite their intuitive appeal, budgets are not necessarily effective in containing spending. For example, budget constraints may be considered soft if hospitals expect a government bail-out in case of overspending [57–59]. Therefore, effectiveness of budgets as a cost containment tool is an empirical question. However, we could only include two studies at the payer level. The introduction of the Balanced Budget Act in the US (1997) limited total spending on Medicare by 112 billion dollar [60]. In response, the Centre for Medicare and Medicaid Services introduced a series of cost-containment measures, such as price reductions and payment reform. After two years, hospitals with higher exposure to Medicare patients ended up with on average 9% lower revenues than hospitals with low Medicare exposure, without declines in actual volume [60]. A systematic review (2 studies) evaluated the effectiveness of GP drug budgets; a significant reduction in pharmaceutical expenses of 27%–70% was found in the UK, while a non-significant reduction of 18%–27% was reported in Ireland [61].

#### 3.1.2. Price controls

Price controls include limits on reimbursements (price setting, fee schedules, price negotiations or reference pricing) and controls of production factors (wages, profits, capital or pharmaceutical inputs). The price of pharmaceuticals in turn may be set based on prices in other countries (external reference pricing) or based on prices of comparator drugs (internal reference pricing). We found two studies on price limits, one study on profit controls, one review on reference pricing (16 studies), one study on external reference pricing, one review on generic substitution (8 studies) and one additional study on generic substitution.

Hospital price cuts due to the US Omnibus Budget Reconciliation Act (1989) has been estimated to reduce spending by 6% for every 10% reduction in price [62]. Reductions in US Medicare homecare prices as a result of the Home Health Interim Payment System (1997) have shown to reduce both use and costs of homecare without any effect on mortality [63]. A systematic review found no evidence for pharmaceutical profit controls for Ireland [64].

One systematic review (16 studies) concluded that internal reference pricing lowered payer spending in most cases, but also increased patient cost sharing, resulting in a marginal reduction in total expenditure [64]. A Danish reform (2005), replacing external reference pricing with internal reference pricing, reduced pharmaceutical spending by 10% [65]. One review found lower costs in four of its eight included studies on substitution from brand-name drugs to clinically equivalent counterparts (generics), while no difference was found in clinical outcomes [66]. The authors commented that although acquisition costs of the target drug declined, increases in inpatient and outpatient utilisation compensated for this. This specific review did not take into account the possibility that pharmaceutical companies may increase prices of other drugs as a result of generic substitution [67]. Contrary to these findings, a study on mandatory generic substitution between 1997 and 1999 found drug cost reductions of \$36 to \$52 (a significant 8% reduction) per health plan member [68].

#### 3.1.3. Volume controls

We found evidence for 17 interventions that aim to control volumes from seven studies and ten reviews (179 studies). Four interventions target supply, and thirteen interventions target demand for care, specifically cost sharing (6 interventions) and benefit restrictions (5 interventions).

Already in 1974 the RAND Health Insurance Experience (HIE) demonstrated in a large randomised controlled trial that cost sharing can contain expenditure [69,70]. We included six papers that confirmed this finding. One review (12 studies) found that high-deductible consumer directed health plans (CDHC) reduced plan expenditure with 5%–15%, corrected for enrollee characteristics [71]. Plans with high coinsurance also bared lower expenditure [72]. One review (29 studies) concluded that both user charges and coinsurance lower drug expenditures [64]. A second review (19 studies) reported drug cost savings even after a small increase in copayments, but also found reduced access to necessary medications [73]. In addition, insurance plans with higher drug copayments were found to have 27% lower pharmaceutical expenditures. Additionally, two-tier plans with higher copayments for branded drugs had lower spending than single tier plans (7–22%). Extra copayments for non-preferred brands had an additional cost-decreasing effect (2–7%) [68]. Also for independent practice associations, increasing pharmaceutical copayments from \$5.00 to \$7.50 resulted in an estimated 12% reduction in pharmaceutical expenditures. For Health Maintenance Organisations, the reduction of pharmaceutical expenditure (3%) was non-significant, suggesting either that copayments were less effective in managed networks or that pharmaceutical adherence was better guarded by these plans [74].

Prior authorisation policies and utilisation review policies may contain costs by reducing overtreatment. A review on prior authorisation (6 studies) found drug-related cost savings [75]. One study demonstrated that drug utilisation review programs reduced total drug expenditures by 7% [76]. According to a recent review (6 studies), prescription caps contain expenditures. However, access to essential drugs may decrease [64].

Mixed results were found for benefit restrictions. One review (9 studies) on prescribing restrictions found either lower costs (6 studies), no significant effect (2 studies), or even higher costs (1 study) [77]. A second review (30 studies) found that reimbursement restrictions predominantly contain costs but could lower patient outcomes [64]. A third review (12 studies) on benefit restrictions found no effect on total costs, primarily due to substitution towards other therapies [73]. A fourth review (59 studies) on managed care formulary restrictions found policies to be effective in 34%, neutral in 37% and ineffective in 29% of the studies [78]. One additional study from South Korea found no significant effects after delisting certain drugs [79].

The effectiveness of patient education to limit demand is also mixed. A review (2 studies) found no cost savings after a patient education program in Spain; in North America direct-to-consumer advertisements to reduce use of certain specific drugs even increased expenditures for these drugs [64]. However, a randomised health promotion intervention for enrollees of a large Californian health plan, consisting of health assessments, education material and participant motivation, reduced claims by \$3.2 to \$8.0 million, between 1989 and 1991 [80].

#### 3.1.4. Market structure policies

We found 22 interventions from 16 studies and 6 reviews (101 studies) aiming to adjust market structure to contain costs. Most studies target payer structure, e.g. by stimulating use of managed care organizations (MCOs).

Earlier studies showed predominantly cost-containing effects of MCOs. A 10% increase in MCO market penetration reduced pre-

mium growth by 7% [72]. MCOs were estimated to have between 8% and 15% lower costs in competitive regional markets [81]. Higher MCO market penetration led to annual hospital savings of 7% in California [82]. MCO penetration seems to have spillover effects; a 1% increase in MCO market share is associated with a 0.9% decrease in fee-for-service (FFS) insurance costs [83]. Due to the managed care backlash in the US, MCOs lost importance for the private markets [83], although Medicare and Medicaid continued to rely on managed care as alternative service providers. However, studies that evaluated Medicaid-managed care models found no significant effects on total costs [84,85]. European experiences with managed care are also mixed. A study from Switzerland found large cost reductions due to managed care, up to 16% compared to traditional insurance [86]. This could be due to patient selection, as the effect on other insurers has not been taken into account. For German insurers, evidence for patient selection in managed care contracts was found. Managed care contracts increased the costs of pharmaceuticals in neighbouring regions and, as a result, total pharmaceutical expenditure increased by 0.2% to 0.8% following each percent increase in managed care penetration [87]. For other forms of payer reforms, limited evidence was found. One study found short-term cost reductions of 30% to 40% due to mental health carve-outs, explained by a combination of financial incentives, reputation effects, patient selection and case management [88].

Payers could reduce cost by altering provision structures and types of providers. One study found 4% cost savings after a Swiss insurer offered telecare as substitute of regular care [86]. An intervention in Florida to provide hospice care and cancer care to nursing home residents reduced government spending by 8% [89]. No significant cost reductions were found for patient-centered medical homes (PCMHs) [90,91]. Reviews on rehabilitation care (0 studies) [92] or mental health community care (42 studies) [93] also found no cost savings. Such results indicate that it may be challenging to launch these provision models that lower costs in the short term whilst also improving quality [91].

As countries have been searching for the optimal level of government involvement, waves of decentralisation and recentralization have been observed across Europe [94,95]. For example, in the UK, commissioning centralized to district health authorities in 1974 [96], decentralized to NHS trusts and fundholding in 1991 and to primary care trusts 2001, and recentralized in 2013 with the conception of clinical commissioning groups [97]. Even in traditionally decentralized countries, e.g. Finland and Denmark, a trend towards centralization has been discerned [98,99]. Decentralisation has been proposed as a measure to contain costs [13]. However, conflicting evidence was found. A multi-country analysis found between 12% and 25% higher cost growth among more decentralised systems [100]. A study on decentralisation in the Spanish NHS found short-term cost increases of 9%–16%, but thereafter a diminished cost growth of 0.5%–1% on an annual basis [101].

Registered nurses, nursing assistants, pharmacists or primary care physicians may perform some tasks and procedures traditionally performed by medical specialists more cheaply. One review (11 studies) found that substitution of tasks towards nursing assistants and pharmacists may lower expenditure, although the quality of the evidence is deemed too low to draw general conclusions [102]. A second review (3 studies) report marginally lower costs of delegating tasks to primary care physicians on emergency care departments [103].

Non-profit and public providers seem to operate with lower expenses. One review (8 studies) found that for-profit providers on average charge 19% higher prices than non-profit providers [104]. A second review (37 studies) found 23 economic comparisons that favoured non-profit ownership, 5 that favoured for-profit ownership and 9 that were inconclusive [105]. A final study found

for-profit MCOs to be more costly per member, although their results were not consistent [106].

### 3.1.5. Market conduct policies

Evaluations of policies aiming to reduce cost by influencing market conduct primarily focused on the effects of competition, payment reform and care coordination. In the latter category, a number of case management programs have been evaluated. The Illinois Health Connect and Your Healthcare Plus intervention produced savings of 7% and 9%, respectively [107]. A Medicaid primary care case management program showed maximal program savings of 7% in Medicaid expenditure [108]. An evaluation of Medicare case management for high-risk patients found cost savings of \$7.7 million over three years, rendering a Return on Investment ratio (ROI) of 1.40. Reductions in readmissions and increases in appropriate medication were found [109]. A health management program of a large California employer saved between \$8.4 million and \$8.8 million, rendering a ROI ratio of between 4.56 and 4.73 [110]. Although one study showed per patient cost decreases of \$89 for high risk patients due to case management, these savings were insufficient to cover the total costs of the program [111]. For other forms of care coordination, less evidence was available. One study demonstrated that GP continuity in Belgium lowered expenditure by 11% [112].

Competition has proven to contain costs in California during the 1980s and 1990s. A study on pro-competitive reforms found cost decreases of 12% in high competition regions [113]. Lower growth of expenses could also be noted in comparison with states that relied on non-competitive strategies [114]. Cost containment retained over the long-term, even increasing bankruptcy risk for public hospitals [115]. Contrary to the California experience, another study found that neither competition, nor regulation contained expenditures. Supply-side factors (e.g. per capita supply of hospital beds and prevalence of specialists) were found to be the main determinants of expenditure growth [116]. One recent study on hospital competition in the UK found no effect on expenditures, although positive effects on quality of care were found [117].

Payment reforms aim to align incentives of providers and payers. In Switzerland, expenditures of capitated networks were 6% lower than networks paid on a fee-for-service base [86]. For Medicaid, capitating GP payments reduced utilisation, but increased expenditures by \$75 per patient due to the high payments necessary to include a sufficient number of physicians into the program [118]. Experiences from Medicaid mental health capitation in Colorado showed moderate cost reduction for the first two years, ranging from 0.5% for for-profit providers to 0.2% for non-profit providers; however, after two years the effects turned insignificant [119]. Interestingly, cost-containment effects were larger for-profit providers, while for-profit status is associated with higher costs. This stipulates that for-profit providers may react more strongly to financial incentives. A literature review (9 studies) on the fiscal effects of P4P found mixed effects; the three most rigorous evaluations did not find any significant savings [120]. However, a more recent study on P4P for GPs found 1% lower expenditures as well as higher quality of care [121]. Another review found no cost evaluations of target payments for general physicians [122].

Prospective payments and DRG payments fix per-patient prices irrespective of the number of activities per diagnosis. For a comprehensive overview of the implementation of DRGs in Europe, see Busse et al. (2011) [123]. Following the implementation of Medicare PPS in 1984, significant reductions in hospital expenditure were found [124,125]. However, DRGs replacing per diem payment in New Jersey showed no significant cost reductions, as price reductions were offset by volume increases [126]. While DRGs may increase efficiency [127], evidence on total spending is mixed. Implementation of a Medicare prospective payment system for home care in 2000 comprised a fixed per patient payment and a

variable component, depending on treatment intensity. The fixed component was increased by the reform, while the variable component was reduced. In net, the reform slightly increased utilisation and expenditure, suggesting that incentives to increase the number of patients seem to have outweighed the incentives to contain per-patient costs [63].

### 3.1.6. Market performance policies

According to theory, structure and conduct of the market determine the market outcome [128]. However, health sector performance can be improved irrespective of market structure and conduct by targeting inefficiencies outside the primary health production process, like reducing administrative costs, waste or fraud. Of all policies targeting non-health costs, only evaluations of health IT and tort reform were found. A literature review on health IT adoption, such as electronic health records, computerised physician order entry, and clinical decision supports, found cost-containment effects, specifically administrative costs and pharmaceutical expenses, in 43 out of a total of 57 evaluations [129]. Tort reform has been shown to decrease defensive medicine and liability premiums, lowering expenditure in the US by 2%–4% [130,131].

## 4. Synthesis

Although interventions were very heterogeneous, some general trends are visible. We found evidence that cost sharing contained total health expenditure [71,72] as well as pharmaceutical expenditure [64,68,73,74]. Evaluations of case management interventions predominantly showed cost savings [107–110]. However, most of these programs do rely on voluntary participation by patients, thus risking selection bias. Insurer competition has been found to contain costs in California [113–115]. Furthermore, unnecessary treatments may be reduced by prior authorisation [75] and utilisation review [76]. Controlling access to care, e.g. by caps on the number of prescriptions [64], could also help to contain pharmaceutical expenditure. Lastly, price limits and budgets may also be effective in containing total payer expenses [60–63].

Other policies show more contradicting results. Payer structure policies for example, specifically those promoting managed care organizations, has shown to either lower costs [72,81–83,86], increase costs [87] or have no effect on costs [84,85]. Payment reform and prospective payments in some cases seem to lower costs [86,119,121] but in other instances they increase costs [63,118] or have no effect on costs [120,122,126]. For-profit provision seems to increase expenses, although not consistently [104–106]. Despite the fact that many countries rely on benefit package restrictions to contain pharmaceutical expenditure, evidence did not consistently indicate cost savings [64,73,77–79].

### 4.1. Identification of knowledge gaps

To identify gaps in the literature, the results are plotted in the overview of cost-containment policies by Stadhouders et al. (2016). Fig. 1 shows that no evaluations were found in 21 of 41 categories. For price controls, evidence on fee schedules and price negotiations is lacking. Regarding supply side volume controls, we found no evidence for capacity controls, such as limits on the number of beds or the number of providers through certificate-of-needs policies, or for labour restrictions, such as limiting the number of practitioners. For demand controls, no evidence evaluating the effects of prevention on a payer level has been included. Additionally, no evaluations of policies limiting the pace of costly innovations were found. In the category of market structure policies, we were unable to include evaluations of antitrust policy, such as merger controls,

or risk redistribution, such as risk equalisation programs. No evaluations were found on the effects of consumer choice, contracting policies or patient choice in the category of market conduct policies. Lastly, no papers were included on administrative reductions, fraud control, waste reduction programs, managerial improvement policies, transparency increases or cost-reducing innovations.

### 4.2. High-quality evidence to guide policymaking

General effects of cost-containment policies are difficult to distil due to the non-random nature of the interventions and the dependency on context. Therefore, we base our policy recommendations on the most robust evidence. Of 43 studies, 13 had low to medium risk of bias and high to medium content validity and reliability. High-quality studies were more likely to find no effect. No effect was found for delisting of benefits, decentralisation, case management, managed care and hospital competition [79,101,111,117].

However, some high-quality papers do find significant cost-saving effects. Firstly, cost sharing could reduce costs. One study found that deductibles and coinsurance are associated with lower premium growth rates [72]. Another study found (tiered) copayments to be effective [68]. Secondly, both managed care and competition have the potential to reduce costs. A 10% increase in HMO market share reduced premium growth with 6.5% between 1985 and 1992 [72]. In addition, long-term effects of cost containment through competitive reforms were found [115]. Cost sharing and competitive reform may go hand-in-hand; managed care might increase competition, and competition on premiums may benefit plans with high cost sharing [132]. Also for reductions of pharmaceutical spending, high-quality evidence is available. Internal reference pricing reduced pharmaceutical spending in Denmark by over 10% [65]. Closely related, generic substitution was shown to reduce pharmaceutical spending by 8% [68]. Lastly, two high-quality studies point to the potential of cost reductions in specific areas such as end-of-life care and tort reform [89,130].

## 5. Discussion

Cost containment in healthcare is a leading policy challenge. Hence, identifying effective policies is vital, but articles evaluating policies on a macro-level are limited and often lack sufficient rigor. Low numbers of evaluations per policy make it challenging to infer effect sizes as well as time- country-, and health system dependency [133]. Many policy options seem understudied and this includes routine strategies such as budgeting and price setting. All OECD countries would benefit from collective efforts to experiment with, and rigorously evaluate promising policies. As policies are often similar, country heterogeneity may be viewed as a strength. Many different approaches have been taken to tackle rising expenditure. Policymakers should harvest from the wide range of experiences, in order to identify the opportunities and challenges of various policy tools. Countries could then fine-tune cost-containment policies to their own setting, identifying and accounting for divergent and paramount contextual factors. Considering the above, the lack of evaluations of effectiveness is disappointing.

Despite a broad search strategy and not overly limiting exclusion criteria, only 61 papers were included. Several factors might account for this. First, it may be challenging to isolate the effect of many policy interventions. For example, most containment policies are part of a broader reform package [134]. Also, some policies exert effects in the long run which may be difficult to isolate. Even for policies that prove effective in the short run, it is questionable whether any significant effect endures in the long run. Second, policies may have been rigorously evaluated but not included in our

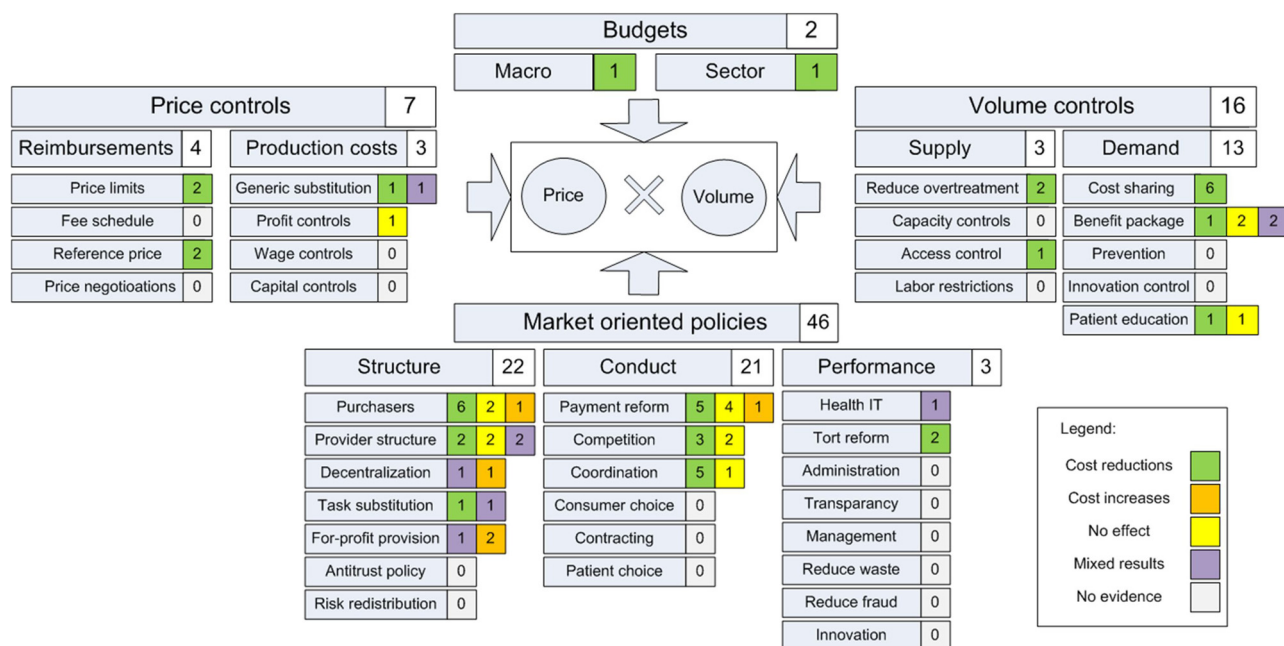


Fig. 1. Summary of findings and effects per policy group.

search strategy, for example because these evaluations were not published in the peer-reviewed literature or have been written in another language. Of the 61 papers included in this review, 44 are from the US. This bias could be alleviated by inclusion of evaluations published outside the peer-reviewed literature or in other languages. Last, and probably most important, a large number of studies evaluated costs from the patient or provider perspective and not from the perspective of the payers. Including such studies would greatly increase the number of papers, although the evidence would be much less robust because cost substitution may be mistaken for cost containment.

This review gives a broad overview of the literature, pointing towards effectiveness of certain specific policies such as cost sharing, managed care competition, reference pricing, generic substitution and tort reform. However, some reservations should be made regarding desirability of these measures. Cost sharing, for example, may reduce both necessary and unnecessary care [135–137]. Second, it could disproportionately affect access by low income groups, which may be undesirable from an ethical perspective [138]. It is also highly unpopular with the electorate and thus comes with political barriers. Thirdly, cost sharing shifts costs to patients, thereby limiting the effect on total healthcare costs. Lastly, cost sharing could have spillover effects to other payers when providers increase treatment intensity of remaining patients [139]. Control of pharmaceutical expenditure by reference pricing and generic substitution is promising. However, attention should be given to the possibilities of pharmaceutical companies shifting costs to unregulated areas [67], or patients shifting to more expensive treatments [73]. Tort reform appears an issue specific to the US.

A substantial body of evidence favours better coordination of care as an effective way to contain cost. This was one of the few policies where mostly positive effects on the quality of care were reported. However, studies on care coordination often contained a high risk of bias due to self-selection into the program of patients and organisations that have a high propensity to obtain a positive effect. Therefore, the actual implementation of proven concepts of care coordination to other settings may be challenging [140]. Furthermore, case management often comes with substan-

tial upfront costs [141]. Although politically appealing, this strategy faces difficult implementation barriers on a short horizon with many different steps and is often highly dependent on specific local conditions.

Most studies show mixed and context-dependent results. For example, payment reforms are often thought to have substantial cost saving potential [142]. However, no such effect was found consistently, suggesting that payment schemes should be designed with great care to prevent undesirable provider responses and to sort out positive effects on costs and quality. Evidently, policies are interconnected and embedded in a broader health system and some may be reinforced or counteracted by other policies [29]. For example competition: under certain conditions, competition may contain costs and specific types of payers (e.g. MCOs) may reinforce this; however, a higher penetration of for-profit providers may lead to higher costs. Moreover, the effect of competition, profit status or payer types may depend on the payment system in place. Mapping policy interrelations and institutions should be an important part of future research on this topic. The adoption of cost-containment policies likely depends on other policy goals such as quality of care, equity and efficiency. In many instances, the pursuit of a cost-containment strategy may come at the cost of one or more of these goals. This would require balance of cost-containment efforts with other important health system goals. Future research should inquire into policy outcomes on all relevant policy metrics and design combinations that sort out an optimal effect.

## 6. Concluding remarks

We collected evidence on the effectiveness of cost-containment policies from a payer perspective, and included 43 original studies and 18 systematic reviews evaluating 72 different cost-containment policies. We compared policy evaluations to policies identified in the literature. Of the 41 groups of cost containment policies, 21 were not evaluated, and even within the remaining groups several policies remain unevaluated. The existing evidence shows that the effectiveness of cost containment policies varies greatly between policies, underlining the need for evidence. Future policy evaluations should focus on the effectiveness of fee sched-

ules, wage controls, capacity controls, prevention and reductions in administrative costs. Special attention should be given to the payer and societal perspective as many evaluations do not take into account cost shifting possibilities by providers and patients.

We summarised the available evidence, providing a broad overview of the literature on effective cost-containment policies. Most evaluations were performed for MCO competition, payment reforms, cost sharing and care coordination. High-quality evidence favors cost sharing, managed care competition, reference pricing, generic substitution and tort reform as effective policies to contain costs. Policymakers aiming to contain costs should resort to these policies to maximise chances of success.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.healthpol.2018.10.015>.

## References

- [1] Keehan SP, Cuckler GA, Sisko AM, Madison AJ, Smith SD, Stone DA, et al. National health expenditure projections, 2014–24: spending growth faster than recent trends. *Health Affairs* 2015;34:1407–17.
- [2] Murthy VN, Okunade AA. Determinants of US health expenditure: evidence from autoregressive distributed lag (ARDL) approach to cointegration. *Economic Modelling* 2016;59:67–73.
- [3] OECD. Retrieved October 2017 Health expenditure-aggregated data; 2017.
- [4] Trabandt M, Uhlig H. The Laffer curve revisited. *Journal of Monetary Economics* 2011;58:305–27.
- [5] De La Maisonneuve C, Martins JO. Public spending on health and long-term care; 2013.
- [6] Berwick DM, Hackbarth AD. Eliminating waste in US health care. *JAMA* 2012;307:1513–6.
- [7] Craig SG, Howard LL. Is Medicaid crowding out other state government expenditure? Internal financing and cross-program substitution. *Regional Science and Urban Economics* 2014;49:164–78.
- [8] Chen W-Y, Liang Y-W, Lin Y-H. Does health spending crowd out defense in the United States? Evidence from wavelet multiresolution analysis. *Defence and Peace Economics* 2017;1–14.
- [9] Gusmano MK, Allin S. Framing the issue of ageing and health care spending in Canada, the United Kingdom and the United States. *Health Economics, Policy and Law* 2014;9:313.
- [10] Reeves A, McKee M, Basu S, Stuckler D. The political economy of austerity and healthcare: cross-national analysis of expenditure changes in 27 European nations 1995–2011. *Health Policy* 2014;115:1–8.
- [11] Mladovsky P, Srivastava D, Cylus J, Karanikolos M, Evetovits T, Thomson S, et al. Health policy responses to the financial crisis in Europe; 2012.
- [12] Karanikolos M, Mladovsky P, Cylus J, Thomson S, Basu S, Stuckler D, et al. Financial crisis, austerity, and health in Europe. *The Lancet* 2013;381:1323–31.
- [13] Stadhouders N, Koolman X, Tanke M, Maarse H, Jeurissen P. Policy options to contain healthcare costs: a review and classification. *Health Policy* 2016;120:486–94.
- [14] Anderson GF, Willink A, Osborn R. Reevaluating “made in America”—two cost-containment ideas from abroad. *New England Journal of Medicine* 2013;368:2247–9.
- [15] Stabile M, Thomson S, Allin S, Boyle S, Busse R, Chevreur K, et al. Health care cost containment strategies used in four other high-income countries hold lessons for the United States. *Health Affairs* 2013;32:643–52.
- [16] Stanton MW, Rutherford MK. Reducing costs in the health care system: learning from what has been done. Rockville: Agency for Healthcare Research and Quality; 2002.
- [17] Lomas J, Fooks C, Rice T, Labelle RJ. Paying physicians in Canada: minding our Ps and Qs. *Health Affairs* 1989;8:80–102.
- [18] Evans RG, Lomas J, Barer ML, Labelle RJ, Fooks C, Stoddart GL, et al. Controlling health expenditures — the Canadian reality. *New England Journal of Medicine* 1989;320:571–7.
- [19] Tai-Seale M, Rice TH, Stearns SC. Volume responses to medicare payment reductions with multiple payers: a test of the McGuire–Pauly model. *Health Economics* 1998;7:199–219.
- [20] Dobson A, DaVanzo J, Sen N. The cost-shift payment ‘hydraulic’: foundation, history, and implications. *Health Affairs* 2006;25:22–33.
- [21] Yip WC. Physician response to Medicare fee reductions: changes in the volume of coronary artery bypass graft (CABG) surgeries in the Medicare and private sectors. *Journal of Health Economics* 1998;17:675–99.
- [22] Burns LR, Pauly MV. Transformation of the Health Care Industry: Curb Your Enthusiasm? *The Milbank Quarterly* 2018;96:57–109.
- [23] Simoens S, Giuffrida A. The impact of physician payment methods on raising the efficiency of the healthcare system. *Applied Health Economics and Health Policy* 2004;3:39–46.
- [24] Han E, Chae S-M, Kim N-S, Park S. Effects of pharmaceutical cost containment policies on doctors’ prescribing behavior: focus on antibiotics. *Health Policy* 2015;119:1245–54.
- [25] Schwierz C. Cost-containment policies in hospital expenditure in the European Union. Directorate General Economic and Financial Affairs (DG ECFIN). European Commission; 2016.
- [26] Berenson R, Hash M, Ault T, Fuchs B, Maxwell S, Potetz L, et al. Cost containment in medicare: a review of what works and what doesn’t. AARP; 2008.
- [27] Hsiao WC, Dunn DL, Verrilli DK. Assessing the implementation of physician-payment reform. *New England Journal of Medicine* 1993;328:928–33.
- [28] NCSL. In: NCoS Legislatures, editor. Health cost containment and efficiencies. 2011. Available at [www.ncsl.org/documents/health/IntroandBriefsCC-16pdf](http://www.ncsl.org/documents/health/IntroandBriefsCC-16pdf).
- [29] Liu X. Policy tools for allocative efficiency of health services. *World Health Organization*; 2003.
- [30] Sharfstein JM, Stuart EA, Antos J. Maryland’s all-payer health reform—a promising work in progress. *JAMA Internal Medicine* 2018.
- [31] Garattini L, Ghislandi S. Off-patent drugs in Italy. *The European Journal of Health Economics* 2006;7:79–83.
- [32] Khan KS, Ter Riet G, Glanville J, Sowden AJ, Kleijnen J. Undertaking systematic reviews of research on effectiveness: CRD’s guidance for carrying out or commissioning reviews. NHS Centre for Reviews and Dissemination; 2001.
- [33] Tricco AC, Zarin W, Antony J, Hutton B, Moher D, Sherifali D, et al. An international survey and modified Delphi approach revealed numerous rapid review methods. *Journal of Clinical Epidemiology* 2016.
- [34] Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Med* 2009;6:e1000100.
- [35] OECD/WHO/Eurostat. A system of health accounts. OECD Publishing; 2011.
- [36] J. Sterne, J. Higgins, B. Reeves. A cochrane risk of Bias assessment tool: for non-randomized studies of interventions (ACROBAT-NRSI), Available online at The Cochrane Collaboration <https://sites.google.com/site/riskofbias2tool/> [Accessed 2014;9:2014].
- [37] Bero L, Grilli R, Grimshaw J, Oxman A. The cochrane effective practice and organisation of care review group. *The Cochrane database of Systematic Reviews Issue* 1998;3.
- [38] Reeves BC, et al. The Cochrane Non-Randomised Studies Methods Group: Including non-randomized studies. *Cochrane Handbook for Systematic Reviews of Interventions* 2011;13(11–13):34.
- [39] Peersman G, Oliver S, Oakley A. EPPI-centre review guidelines: data collections for the EPIC database London: EPPI-centre. Social Science Research Unit, Institute of Education, University of London; 1997.
- [40] Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *American Journal of Public Health* 1999;89:1322–7.
- [41] West SL, King V, Carey TS, Lohr KN, McKoy N, Sutton SF, et al. Systems to rate the strength of scientific evidence. Agency for Healthcare Research and Quality, US Department of Health and Human Services; 2002.
- [42] Harbour Robin, Juliet Miller. A new system for grading recommendations in evidence based guidelines. *BMJ* 2001;323(7308):334–6.
- [43] Group GW. Grading quality of evidence and strength of recommendations. *BMJ: British Medical Journal* 2004;328:1490.
- [44] Walker DG, Wilson RF, Sharma R, Bridges J, Niessen L, Bass EB, et al. Best practices for conducting economic evaluations in health care: a systematic review of quality assessment tools; 2012.
- [45] Evers S, Goossens M, de Vet H, van Tulder M, Ament A. Criteria list for assessment of methodological quality of economic evaluations: consensus on Health Economic Criteria. *International Journal of Technology Assessment in Health Care* 2005;21:240–5.
- [46] Shea BJ, Grimshaw JM, Wells GA, Boers M, Andersson N, Hamel C, et al. Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. *BMC Medical Research Methodology* 2007;7:10.
- [47] Whitlock EP, Lin JS, Chou R, Shekelle P, Robinson KA. Using existing systematic reviews in complex systematic reviews. *Annals of Internal Medicine* 2008;148:776–82.
- [48] Pane GA, Taliaferro EH. Health care cost containment: an overview of policy options. *Annals of Emergency Medicine* 1994;23:103–8.
- [49] Ellis RP, McGuire TG. Supply-side and demand-side cost sharing in health care. *The Journal of Economic Perspectives* 1993;7:135–51.
- [50] Moreno-Serra R. The impact of cost-containment policies on health expenditure: evidence from recent OECD experiences. *OECD Journal on Budgeting* 2014;13, 1B.

- [51] Mongan JJ, Ferris TG, Lee TH. Options for slowing the growth of health care costs. *New England Journal of Medicine* 2008;358:1509–14.
- [52] White J. Targets and systems of health care cost control. *Journal of Health Politics, Policy and Law* 1999;24:653–96.
- [53] Vogler S, Zimmermann N, de Joncheere K. Policy interventions related to medicines: survey of measures taken in European countries during 2010–2015. *Health Policy* 2016;120:1363–77.
- [54] Schünemann HJ, Oxman AD, Higgins JP, Vist GE, Glasziou P, Guyatt GH. Presenting results and 'Summary of findings' tables. *Cochrane handbook for systematic reviews of interventions* version; 2008. p. 5.
- [55] Abel-Smith B, Mossialos E. Cost containment and health care reform: a study of the European Union. *Health Policy* 1994;28:89–132.
- [56] Wolfe PR, Moran DW. Global budgeting in the OECD countries. *Health Care Financing Review* 1993;14:55–76.
- [57] Kornai J. The soft budget constraint syndrome in the hospital sector. *Society and Economy* 2009;31:5–31.
- [58] Rodden JA, Rodden J, Eskeland GS, Litvack JI. *Fiscal decentralization and the challenge of hard budget constraints*. MIT press; 2003.
- [59] Tjerbo T, Hagen TP. Deficits, soft budget constraints and bailouts: budgeting after the Norwegian hospital reform. *Scandinavian Political Studies* 2009;32:337–58.
- [60] Bazzoli GJ, Lindrooth RC, Hasnain-Wynia R, Needleman J. The balanced budget act of 1997 and U.S. Hospital operations. *Inquiry* 2005;(41):401–17.
- [61] Sturm H, Austvoll-Dahlgren A, Aaserud M, Oxman AD, Ramsay C, Vernby A, et al. Pharmaceutical policies: effects of financial incentives for prescribers. *The Cochrane Database of Systematic Reviews* 2007;CD006731.
- [62] Nguyen NX. Physician volume response to price controls. *Health Policy* 1996;35:189–204.
- [63] Huckfeldt PJ, Sood N, Escarce JJ, Grabowski DC, Newhouse JP. Effects of Medicare payment reform: evidence from the home health interim and prospective payment systems. *Journal of Health Economics* 2014;34:1–18.
- [64] Lee IH, Bloor K, Hewitt C, Maynard A. International experience in controlling pharmaceutical expenditure: influencing patients and providers and regulating industry – a systematic review. *Journal of Health Services Research & Policy* 2015;20:52–9.
- [65] Kaiser U, Mendez SJ, Ronde T, Ullrich H. Regulation of pharmaceutical prices: evidence from a reference price reform in Denmark. *Journal of Health Economics* 2014;36:174–87.
- [66] Gothe H, Schall I, Saverno K, Mitrovic M, Luzak A, Brixner D, et al. The impact of generic substitution on health and economic outcomes: a systematic review. *Applied Health Economics and Health Policy* 2015;13(Suppl. 1):S21–33.
- [67] Mestre-Ferrandiz J. Reference prices and generic medicines: What can we expect? *Journal of Generic Medicines* 2003;1:31–8.
- [68] Joyce GF, Escarce JJ, Solomon MD, Goldman DP. Employer drug benefit plans and spending on prescription drugs. *JAMA-Journal of the American Medical Association* 2002;288:1733–9.
- [69] Newhouse JP, Manning WG, Morris CN, Orr LL, Duan N, Keeler EB, et al. Some interim results from a controlled trial of cost sharing in health insurance. *New England Journal of Medicine* 1981;305:1501–7.
- [70] Manning WG, Newhouse JP, Duan N, Keeler EB, Leibowitz A. Health insurance and the demand for medical care: evidence from a randomized experiment. *The American Economic Review* 1987;251–77.
- [71] Bundorf MK. Consumer-directed health plans: a review of the evidence. *Journal of Risk and Insurance* 2016;83:9–41.
- [72] Feldstein PJ, Wickizer TM. Analysis of private health insurance premium growth rates: 1985–1992. *Medical Care* 1995;33:1035–50.
- [73] Soumerai SB, Rossdegnan D, Fortess EE, Abelson JA. Critical analysis of studies of State Drug Reimbursement policies – research in need of discipline. *Milbank Quarterly* 1993;71:217–52.
- [74] Hillman AL, Pauly MV, Escarce JL, Ripley K, Gaynor M, Clouse J, et al. Financial incentives and drug spending in managed care. *Health Affairs* 1999;18:189–200.
- [75] MacKinnon N, Kumar R. Prior authorization programs: a critical review of the literature. *Journal of Managed Care Pharmacy* 2001;7:297–303.
- [76] Moore WJ, Gutermauth K, Pracht EE. Systemwide effects of Medicaid retrospective drug utilization review programs. *Journal of Health Politics Policy and Law* 2000;25:653–88.
- [77] Green CJ, Maclure M, Fortin PM, Ramsay CR, Aaserud M, Bardal S. Pharmaceutical policies: effects of restrictions on reimbursement. *Cochrane Database of Systematic Reviews* 2010;CD008654.
- [78] Happe LE, Clark D, Holliday E, Young T. A systematic literature review assessing the directional impact of managed care formulary restrictions on medication adherence, clinical outcomes, economic outcomes, and health care resource utilization. *Journal of Managed Care Pharmacy* 2014;20:677–+.
- [79] Park Chan-Mi, et al. Effects of delisting nonprescription combination drugs on health insurance expenditures for pharmaceuticals in Korea. *Health Policy* 2016;120(6):590–5.
- [80] Fries JF, Harrington H, Edwards R, Kent LA, Richardson N. Randomized controlled trial of cost reductions from a health education program: the California public Employees' Retirement System (PERS) study. *American Journal of Health Promotion: AJHP* 1994;8:216–23.
- [81] Bamezai A. Price Competition and Hospital Cost Growth in the United States (1989–1994). *Health Economics* 1999;8:233–43.
- [82] Robinson JC. HMO market penetration and hospital cost inflation in California. *JAMA* 1991;266:2719–23.
- [83] Chernew M, DeCicca P, Town R. Managed care and medical expenditures of medicare beneficiaries. *Journal of Health Economics* 2008;27:1451–61.
- [84] Harman JS, Lemak CH, Al-Amin M, Hall AG, Duncan RP. Changes in per member per month expenditures after implementation of Florida's Medicaid reform demonstration. *Health Services Research* 2011;46:787–804.
- [85] Burns ME. Medicaid managed care and cost containment in the adult disabled population. *Medical Care* 2009;47:1069–76.
- [86] Reich O, Rapold R, Flatscher-Thoni M. An empirical investigation of the efficiency effects of integrated care models in Switzerland. *International Journal of Integrated Care* 2012:12.
- [87] Ehlert A, Oberschachtsiek D. Does managed care reduce health care expenditure? Evidence from spatial panel data. *International Journal of Health Care Finance and Economics* 2014;14:207–27.
- [88] Ma CA, McGuire TG. Costs and incentives in a behavioral health carve-out. *Health Affairs (Millwood)* 1998;17:53–69.
- [89] Gozalo PL, Miller SC, Intrator O, Barber JP, Mor V. Hospice effect on government expenditures among nursing home residents. *Health Services Research* 2008;43:134–53.
- [90] Werner RM, Duggan M, Duey K, Zhu J, Stuart EA. The patient-centered medical home: an evaluation of a single private payer demonstration in New Jersey. *Medical Care* 2013;51:487–93.
- [91] Cole ES, Campbell C, Diana ML, Webber L, Culbertson R. Primary care, patient-centered medical homes in Louisiana had minimal impact on Medicaid population's use of acute care and costs. *Health Affairs* 2015;34:86–94.
- [92] Ward D, Drahota A, Gal D, Severs M, Dean TP. Care home versus hospital and own home environments for rehabilitation of older people. *Cochrane Database of Systematic Reviews* 2008;(4), <http://dx.doi.org/10.1002/14651858.CD003164.pub2>. Art. No.: CD003164.
- [93] Roberts E, Cumming J, Nelson K. A review of economic evaluations of community mental health care. *Medical Care Research and Review* 2005;62:503–43.
- [94] Costa-Font J, Greer SL. Federalism and decentralization in European health and social care. *Palgrave Macmillan*; 2012.
- [95] Saltman RB. Decentralization, re-centralization and future European health policy. *European Journal of Public Health* 2008;18:104–6.
- [96] Allen P. New localism in the English National Health Service: what is it for? *Health Policy* 2006;79:244–52.
- [97] Checkland K, Dam R, Hammond J, Coleman A, Segar J, Mays N, et al. Being autonomous and having space in which to act: commissioning in the 'new NHS' in England. *Journal of Social Policy* 2018;47:377–95.
- [98] Vrangbaek K, Christiansen T. Health policy in Denmark: leaving the decentralized welfare path? *Journal of Health Politics, Policy and Law* 2005;30:29–52.
- [99] Medin E, Häkkinen U, Linna M, Anthun KS, Kittelsen SA, Rehnberg C, et al. International hospital productivity comparison: experiences from the Nordic countries. *Health Policy* 2013;112:80–7.
- [100] Mosca I. Decentralization as a determinant of health care expenditure: empirical analysis for OECD countries. *Applied Economics Letters* 2007;14:511–5.
- [101] Costa-Font J, Moscone F. The impact of decentralization and inter-territorial interactions on Spanish health expenditure. *Empirical Economics* 2008;34:167–84.
- [102] Laurant M, Harmsen M, Wollersheim H, Grol R, Faber M, Sibbald B. The impact of nonphysician clinicians: do they improve the quality and cost-effectiveness of health care services? *Medical Care Research and Review* 2009;66, 1077558709346277.
- [103] Khangura JK, Flodgren G, Perera R, Rowe BH, Shepperd S. Primary care professionals providing non-urgent care in hospital emergency departments. *Cochrane Database of Systematic Reviews* 2012;11:CD002097.
- [104] Devereaux PJ, Heels-Ansdell D, Lacchetti C, Haines T, Burns KEA, Cook DJ, et al. Payments for care at private for-profit and private not-for-profit hospitals: a systematic review and meta-analysis. *CMAJ: Canadian Medical Association Journal = Journal de l'Association Médicale Canadienne* 2004;170:1817–24.
- [105] Rosenau PV. Performance evaluations of for-profit and nonprofit U.S. hospitals since 1980. *Nonprofit Management and Leadership* 2003;(13):401–23.
- [106] Schlesinger M, Blumenthal D, Schlesinger E. Profits under pressure. The economic performance of investor-owned and nonprofit health maintenance organizations. *Medical Care* 1986;24:615–27.
- [107] Phillips Jr RL, Han M, Petterson SM, Makaroff LA, Liaw WR. Cost, utilization, and quality of care: an evaluation of illinois' Medicaid primary care case management program. *Annals of Family Medicine* 2014;12:408–17.
- [108] Muller A, Baker JA. Evaluation of the Arkansas Medicaid primary care physician management program. *Health Care Financing Review* 1996;17:117–33.
- [109] Hawkins K, Parker PM, Hommer CE, Bhattarai GR, Huang JH, Wells TS, et al. Evaluation of a high-risk case management pilot program for medicare beneficiaries with medigap coverage. *Population Health Management* 2015;18:93–103.
- [110] Ozminkowski RJ, Dunn RL, Goetzel RZ, Cantor RI, Murnane J, Harrison M. A return on investment evaluation of the Citibank, NA, health management program. *American Journal of Health Promotion* 1999;14:31–43.
- [111] Kranker K. Effects of Medicaid disease management programs on medical expenditures: evidence from a natural experiment in Georgia. *Journal of Health Economics* 2016;46:52–69.
- [112] De Maeseneer JM, De Prins L, Gosset C, Heyerick J. Provider continuity in family medicine: does it make a difference for total health care costs? *Annals of Family Medicine* 2003;1:144–8.
- [113] Melnick GA, Zwanziger J. Hospital behavior under competition and cost-containment policies. The California experience, 1980 to 1985. *JAMA* 1988;260:2669–75.



- [114] Melnick GA, Zwanziger J. State health care expenditures under competition and regulation, 1980 through 1991. *American Journal of Public Health* 1995;(85):1391–6.
- [115] Mobley LR. Effects of selective contracting on hospital efficiency, costs and accessibility. *Health Economics* 1998;7:247–61.
- [116] Merrill J, McLaughlin C. Competition versus regulation: some empirical evidence. *Journal of Health Politics, Policy and Law* 1986;10:613–23.
- [117] Gaynor M, Moreno-Serra R, Propper C. Death by market power: reform, competition, and patient outcomes in the national health service. *American Economic Journal: Economic Policy* 2013;5:134–66.
- [118] Gosden T, Forland F, Kristiansen IS, Sutton M, Leese B, Giuffrida A, et al. Capitation, salary, fee-for-service and mixed systems of payment: effects on the behaviour of primary care physicians. *The Cochrane Database of Systematic Reviews* 2000:CD002215.
- [119] Bloom JR, Wang H, Kang SH, Wallace NT, Hyun JK, Hu T-w. Capitation of public mental health services in Colorado: a five-year follow-up of system-level effects. *Psychiatric Services (Washington, DC)* 2011;62:179–85.
- [120] Emmert M, Eijkenaar F, Kemter H, Esslinger AS, Schoffski O. Economic evaluation of pay-for-Performance in health care: a systematic review. *European Journal of Health Economics* 2012;13:755–67.
- [121] Lemak CH, Nabra TA, Cohen GR, Erb ND, Paustian ML, Share D, et al. Michigan's fee-for-value physician incentive program reduces spending and improves quality in primary care. *Health Affairs* 2015;34:645–52.
- [122] Giuffrida A, Gosden T, Forland F, Kristiansen I, Sergison M, Leese B, Pedersen L, Sutton M. Target payments in primary care: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews* 1999;(4), <http://dx.doi.org/10.1002/14651858.CD000531>. Art. No.: CD000531.
- [123] Busse R, Geissler A, Quentin W. *Diagnosis-Related Groups in Europe: moving towards transparency, efficiency and quality in hospitals*. UK: McGraw-Hill Education; 2011.
- [124] Sloan FA, Morrisey MA, Valvona J. Effects of the Medicare prospective payment system on hospital cost containment: an early appraisal. *The Milbank Quarterly* 1988;66:191–220.
- [125] Feder J, Hadley J, Zuckerman S. How did Medicare's prospective payment system affect hospitals? *New England Journal of Medicine* 1987;317:867–73.
- [126] Hsiao WC, Dunn DL. The impact of DRG payment on New Jersey hospitals. *Inquiry* 1987;212–20.
- [127] Bjørn E, Hagen TP, Iversen T, Magnussen J. The effect of activity-based financing on hospital efficiency: a panel data analysis of DEA efficiency scores 1992–2000. *Health Care Management Science* 2003;6:271–83.
- [128] Martin S. *Industrial organization in context*. Oxford University Press; 2010.
- [129] H. Low AF, Phillips AB, Ancker JS, Patel AR, Kern LM, Kaushal R. Financial effects of health information technology: a systematic review. *American Journal of Managed Care* 2013;19:1. SP369–76.
- [130] Hellinger FJ, Encinosa WE. The impact of state laws limiting malpractice damage awards on health care expenditures. *American Journal of Public Health* 2006;96:1375–81.
- [131] Avraham R, Dafny LS, Schanzenbach MM. The impact of tort reform on employer-sponsored health insurance premiums. *Journal of Law, Economics, and Organization* 2012;28:657–86.
- [132] Newhouse JP. Consumer-directed health plans and the RAND health insurance experiment. *Health Affairs* 2004;23:107–13.
- [133] Dixon A, Poteliakhoff E. Back to the future: 10 years of European health reforms. *Health Economics, Policy and Law* 2012;7:1–10.
- [134] Emanuel E, Tanden N, Altman S, Armstrong S, Berwick D, de Brantes F, et al. A systemic approach to containing health care spending. *New England Journal of Medicine* 2012;367:949–54.
- [135] Kim J, Ko S, Yang B. The effects of patient cost sharing on ambulatory utilization in South Korea. *Health Policy* 2005;72:293–300.
- [136] Kupor SA, Liu Y-C, Lee J, Yoshikawa A. The effect of copayments and income on the utilization of medical care by subscribers to Japan's national health insurance system. *International Journal of Health Services* 1995;25:295–312.
- [137] Sinnott S-J, Buckley C, O'Riordan D, Bradley C, Whelton H. The effect of copayments for prescriptions on adherence to prescription medicines in publicly insured populations; a systematic review and meta-analysis. *PLoS One* 2013;8:e64914.
- [138] Denier Y. *Efficiency, justice and care*. Springer; 2007.
- [139] Ravesteijn B, Schachar EB, Beekman AT, Janssen RT, Jeurissen PP. Association of cost sharing with mental health care use, involuntary commitment, and acute care. *JAMA Psychiatry* 2017;74:932–9.
- [140] Hoogendijk EO. How effective is integrated care for community-dwelling frail older people? The case of the Netherlands. *Age and Ageing* 2016;45:585–8.
- [141] Bloem BR, Rompen L, NMD Vries, Klink A, Munneke M, Jeurissen P. *ParkinsonNet: a low-cost health care innovation with a systems approach from the Netherlands*. *Health Affairs* 2017;36:1987–96.
- [142] Hussey PS, Eibner C, Ridgely MS, McGlynn EA. Controlling U.S. health care spending – separating promising from unpromising approaches. *New England Journal of Medicine* 2009;361:2109–11.