



Review Article

# Value-Based Health Care for Inflammatory Bowel Diseases

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## Abstract

Increasing healthcare costs worldwide put the current healthcare systems under pressure. Although many efforts have aimed to contain costs in medicine, only a few have achieved substantial changes. Inflammatory bowel diseases rank among the most costly of chronic diseases, and physicians nowadays are increasingly engaged in health economics discussions. Value-based health care [VBHC] has gained a lot of attention recently, and is thought to be the way forward to contain costs while maintaining quality. The key concept behind VBHC is to improve achieved outcomes per encountered costs, and evaluate performance accordingly. Four main components need to be in place for the system to be effective: [1] accurate measurement of health outcomes and costs; [2] reporting of these outcomes and benchmarking against other providers; [3] identification of areas in need of improvement based on these data and adjusting the care delivery processes accordingly; and [4] rewarding high-performing participants. In this article we will explore the key components of VBHC, we will review available evidence focussing on inflammatory bowel diseases, and we will present our own experience as a guide for other providers.

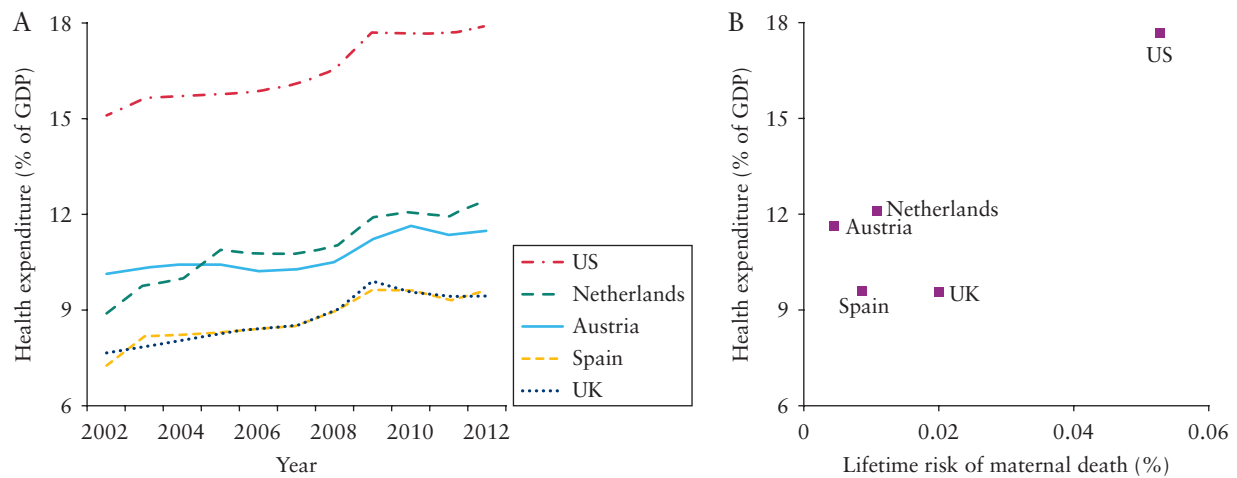
**Keywords:** Value-based health care; inflammatory bowel diseases; disease management

## 1. Introduction

Worldwide, healthcare costs continue to increase at an alarming pace. Despite differences in care delivery and financial infrastructure, most countries cope with similar trends of increasing health expenditures. It seems to be a universal ‘unsolvable’ problem [Figure 1a]. Disturbingly, the expenditure increase is not consistently accompanied by an increase in quality and improved health outcomes [Figure 1b].<sup>1</sup> Various factors contribute to the problem: ineffective care delivery, excessive administration costs, non-adherence to guidelines, uncoordinated care, practise of defensive medicine, lack of preventive care, and introduction of new technologies.<sup>2</sup> One overarching notion that has emerged is that necessary preventive care is underdelivered, whereas unnecessary care is overdelivered. Indeed, due to current ‘fee-for-service’ payment structures, physicians are incentivized to often deliver more care than is necessary. Patients are usually unaware since there is little

reporting on quality and health outcomes by individual physicians or hospitals.

Though reforms have addressed one or more of the aforementioned items, none has managed to achieve substantial savings that bend the overall cost curve. Solutions to reduce healthcare spending have frequently involved shifting costs around among participants: shifting costs from insurers to patients by increasing the annual premiums; shifting costs between insurers; or shifting costs towards providers by introducing capitation payments. However, shifting costs around has not resulted in decreased overall spending in any way.<sup>3</sup> Recently, it has become accepted that a complete care redesign, involving all stakeholders, is warranted to solve the healthcare crisis. Moreover, the right incentives should be put in place for all participants in order to ensure sustainability. An area which is rapidly gaining ground is the area of ‘value-based health care’ [VBHC] which focuses solely on achieved health outcomes and associated



**Figure 1.** Healthcare data for the USA and four European countries. [a] Growth in health expenditure as % of gross domestic product [GDP] between 2002 and 2012. [b] Relation between health expenditure and lifetime risk of maternal death. Source: World Bank, Health Nutrition and Population Statistics.

cost-effectiveness. This review introduces the concepts and rationale behind VBHC and provides early results observed in the care of patients with inflammatory bowel diseases [IBD].

## 2. Value-Based Health Care

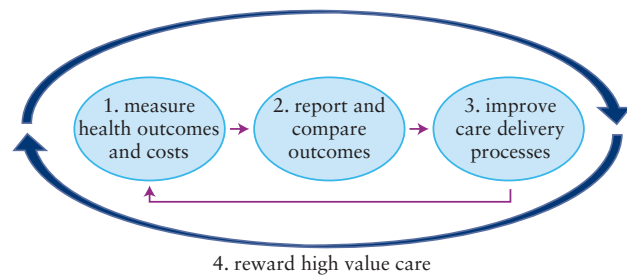
The main concept of VBHC is to evaluate health outcomes and their associated costs at the condition level. Value in health care can be calculated by dividing health outcomes by the costs encountered.<sup>3,4</sup> Four key components need to be addressed to achieve health value improvement: [1] accurate measurement of health outcomes and associated costs; [2] transparent outcome reporting with a classification of performance level [eg excellent, good, fair, poor]; [3] subsequent improvement of care delivery in a coordinated care setting organized around a single disease; and [4] payment reform to create the proper incentives for healthcare participants [Figure 2]. We will now discuss the rationale to use those four individual key VBHC components.

### 2.1 Measurement of value

To measure value in health care, both health outcomes [ie quality] and costs will need to be measured accurately. We will start by discussing the general theory on different ways to measure quality of care and outcomes in health care, and we will also discuss specific measures used in IBD. Thereafter, we will discuss costs measurement and one particularly useful method: time-driven activity-based costing [TDABC].

#### 2.1.1 Quality

Quality of care can be assessed using structure, process, or outcome measures.<sup>5</sup> A structural measure is related to the structure of the care delivery, for example, the number of gastroenterologists that work in a hospital. Process measures are related to the process of care delivery, for example, the percentage of patients that were tested for tuberculosis prior to starting an anti-TNF $\alpha$  agent. Outcome measures are related to the outcomes of the delivered care, for example the quality of life of a patient after a certain procedure. Structure measures are usually easy to measure but are generally poorly correlated with outcomes. Outcome measures, on the other hand, are what matter most to the patient. However, it can take a long time to assess outcomes, especially in chronic disease management, which



**Figure 2.** The four components of value-based health care represented in a positive feedback loop on the provider level, which can be accelerated by rewarding high value care on a regulatory level: [1] measure value [ie outcomes and costs]; [2] report and benchmark outcomes against other providers; [3] improve the care delivery process based on observed outcomes; and [4] reward high-value care.

generates delays in quality reporting. Process measures are easier to measure and represent the medical practice well. However, process measures should be closely correlated with outcomes in order to be meaningful.<sup>5,6</sup>

To measure health value, Porter<sup>7</sup> proposes always measuring value around what is important to the patient. Outcomes, or results, are what count to patients and therefore he proposes to measure value based on achieved results—instead of using surrogate markers such as structure and process measures. However, whereas health outcomes should be used to assess value, process measures can be very useful to improve internal processes. Porter proposes measuring outcomes in three tiers: [1] health status achieved or retained; [2] the quality and duration of the recovery process; and [3] the sustainability of the achieved health status.<sup>7</sup>

Additionally, the use of patient-reported outcomes [PROs] is an expanding field. The U.S. Food and Drug Administration [FDA] requires the use of validated PROs in clinical trials for drugs and medical device labeling.<sup>8</sup> In 2004, the National Institutes of Health [NIH] launched the Patient Reported Outcomes Measurement Information System [PROMIS] initiative [[www.nihpromis.gov](http://www.nihpromis.gov)]. This initiative aims to support progress in clinical research by building and validating common item banks of PROs that measure symptoms and outcomes applicable to a wide variety of diseases. This will facilitate straightforward interpretation of clinical trial data and make comparisons between different studies easier.<sup>9</sup>

IBD quality measures have been developed by the American Gastroenterology Association [AGA] in conjunction with the Crohn's and Colitis Foundation America [CCFA], in 2011.<sup>10</sup> These are 10 process quality indicators [Qis] related to adherence to IBD practice guidelines, consisting of eight outpatient Qis and two inpatient Qis. Additionally the CCFA developed a separate set of 10 process indicators, of which five overlap with the AGA Qi set. A set of 10 outcome measures was developed by the CCFA as well and include corticosteroid use, hospitalizations and emergency room [ER] visits, productivity, quality of life, malnutrition, anemia, night-time bowel movements or leakage, incontinence, and narcotics use.<sup>6</sup> Within the PROMIS framework a gastrointestinal [GI] symptom bank was developed as well. The GI symptom bank consists of scales applicable to both patients with a GI disease and to the general population. GI symptoms are measured in seven domains: gas/bloating flatulence, nausea/vomiting, diarrhea, constipation, bowel incontinence/soilage, heartburn/reflux, and disrupted swallowing.<sup>11</sup>

At UCLA we are currently measuring all outcomes relevant to patients: disease control, quality of life [QoL], and [work] productivity.<sup>12</sup> All three are used to: [1] monitor achieved outcomes [tier 1]; [2] estimate the time to recovery and the level of discomfort during flares [tier 2]; and [3] measure relapse rate [tier 3]. All outcomes are assessed on a regular basis to establish the performance of the implemented care program as well as to allow for early intervention in case of disease progression. Specific care scenarios with different frequencies of outcome monitoring are allocated based upon individual risk profiles. In addition, the AGA process Qis are tracked internally in order to identify areas for process improvement. [Ho *et al.*, unpublished data].

### 2.1.2 Costs

For accurate value calculations, costs need to be measured in great detail. In most hospitals, accounting systems are designed for reimbursement purposes. Hence, costs are calculated using the charges on individual line items and do not always directly correlate with actual costs.<sup>13</sup> To truly understand what the costs of a treatment process are, the Time-Driven Activity-Based Costing [TDABC] method can be used. This method calculates costs of a care process based on the amount of time spent for every step in the care process. This time is then multiplied with the costs per time-unit of the resources [eg personnel, space, equipment] involved.<sup>14</sup> The use of TDABC offers the benefit of accurate cost measurement, and is simultaneously a way to get insight into how to make care delivery more cost-effective. TDABC will help hospitals identify areas in the care process that can be delivered more efficiently, estimate the financial benefits of task differentiation between different providers, and calculate return on investment in quality improvement.<sup>14</sup>

TDABC pilots have been run in a variety of centers in Belgium,<sup>15,16</sup> at the Cleveland clinic [USA],<sup>17</sup> University of California Los Angeles [USA],<sup>18</sup> the Boston Children's Hospital [USA],<sup>19</sup> and the University of Calgary [Canada].<sup>20</sup> The Belgian study estimated costs using TDABC in five outpatient clinics and reported improvements in operations based on TDABC results. Through internal benchmarking times for procedure steps between different departments, more effective methods were identified.<sup>16</sup> The Cleveland Clinic used TDABC to map and cost two heart valve procedures. They were able to estimate accurate costs for each of the processes and found that calculated costs were approximately 10% lower than the costs calculated using the administrative data. In addition, the TDABC method helped them to identify redundancy in their processes, to reassign tasks in order to have everyone perform tasks at the top of their license, and to get a closer insight on non-billable activities.<sup>17</sup> Using TDABC, the Boston

Children's hospital was able to decrease total visit time for plagioccephalic care by 19.9% [7:29 minutes] due to workflow improvements. Costs increased by 7.7% [US\$8.22] per visit, but this was offset by the additional time available to see two extra patients per day.<sup>19</sup> The UCLA department of Neurosurgery reports similar advantages using a continuous cycle of identification of variation, identifying the most cost-effective solution, and process improvement.<sup>18</sup>

At UCLA, we started to use the TDABC model to assess the costs associated with Qi implementation in clinic. We identified seven types of personnel involved in the Qi process in the GI clinic. For the IBD clinic, total costs for general IBD measures including vaccinations, documentation of disease activity, and tobacco use, were US\$80.33; addition of bone loss assessment increased the costs to US\$91.41; and addition of process costs for checking hepatitis B and tuberculosis prior to anti-TNF $\alpha$  therapy initiation was US\$108.76 [Ho *et al.*, unpublished data]. In future efforts, radiology costs and lab costs will be estimated using TDABC as well, for a more comprehensive value calculation.

## 2.2 Outcome reporting

Outcome registries are thought to increase value by driving patient and physician improvements. If outcome registries are publicly available, patients can choose the best medical practice for their care and avoid physicians with poor outcomes. On the other hand, registries offer the potential for providers to benchmark themselves against other practitioners and identify areas where they are lagging behind, and subsequently improve. The effect of health registries in Sweden was recently analyzed in depth by the Boston Consultancy Group [BCG]. Sweden has had an interest in tracking outcomes since the 1800s and implemented official registries covering a broad array of diseases in the 1970s. Sweden's health outcomes are among the best in Europe, whereas costs are around average. BCG found that while reporting on acute lymphoblastic leukemia [ALL] survival rates, ALL treatments dramatically improved with an increase in survival rates from 12% in the early 1970s to 89% in 2005. Similarly, side effects from cataract surgery decreased dramatically. Though no comparative studies were done, some indications of the impact of disease registries were found. Two hospitals with low outcomes in survival rates after a myocardial infarction changed their practice after public reporting and achieved a 50% reduction in 30-day mortality within 2 years of the report.<sup>21</sup>

Disease-specific examples are identified as well. A steady rise in in-vitro fertilization [IVF] success rates was observed in the USA, after the Centers for Disease Control and Prevention started publicly reporting IVF outcomes. This can be illustrated by a decrease in the number of IVF cycles entailing the transfer of three or more embryos from 83% to 35%.<sup>22</sup> Similarly, in the cardiac surgery field, a decrease was observed in mortality rates after coronary artery bypass graft [CABG] surgery from 3.2% in 1996 to 2.2% in 2005 in the presence of a public reporting system.<sup>23</sup> In a blog post for the Harvard Business Review, Toby Cosgrove, Chief Executive Officer of the Cleveland Clinic, reported a decrease in infections after surgery by 40% and a decrease of urinary tract infections by 50%, after reporting of provider performance data.<sup>24</sup> In Europe, several countries have implemented registries as well, measuring quality indicators, outcomes, and/or patient satisfaction data.<sup>25</sup>

Due to the nature of the available data, it remains hard to assess whether observed effects are a direct cause of the registries or of progress in the medical sciences. A literature review from the U.S. Agency for Healthcare Research and Quality, analyzing 97 qualitative and 101 quantitative studies, found overall substantial evidence that reporting leads to improvements in the quality measures and moderate evidence that reporting might lead to a reduction in mortality. They also showed

that reporting requirements mainly drive changes in physician behavior, rather than in patient behavior such as choosing a different doctor based on reports.<sup>26</sup> Furthermore, there is emerging evidence that introduction of public reporting systems leads to a reduction in costs. A recent retrospective controlled study found a decrease of 13.7% in CABG prices and 11.4% in percutaneous transluminal intervention [PTI] prices after introduction of a public reporting system.<sup>27</sup>

IBD outcome registries are being built as well. As previously mentioned, the AGA developed a set of 10 Qi measures for IBD specifically.<sup>10</sup> Reporting of eight of the 10 AGA quality measures to the Centers for Medicare and Medicaid Services [CMS] is required in specific conditions in the USA, and reporting of those measures to CMS is directly linked to reimbursements.<sup>18</sup> In 2013, the British Society of Gastroenterology launched a national IBD specific registry as well, which includes information on number of patients, admissions, surgeries, and medication use for national benchmarking.<sup>28</sup>

### 2.3 Care coordination

In order to deliver high-value care, the most accurate treatment should be chosen for the right patient, at the right location, at the right time. Practice guidelines have been installed by many physician associations. However, guidelines are not followed consistently. In a 2010–2012 US nationwide analysis, we showed that 42% of Crohn's disease patients were prescribed 5-aminosalicylic acid [5-ASA] even though not supported by current guidelines, and steroid-sparing medication was prescribed infrequently, whereas 9% of all IBD patients used long-term [ $> 3$  months] steroids.<sup>29</sup> Reasons for guideline non-adherence could be a lack of incentives for guideline adherence, lack of access to guidelines, or a lack of trust towards guidelines.<sup>30</sup>

Care coordination has been proposed to be a key need in order to improve care quality. Care coordination includes the use of evidence-based care pathways by a multidisciplinary care team ensuring continuity of care and engaging the patient in the care process.<sup>31</sup> A study in an insurance claims database, analyzing continuity of care defined as the percentage of visits with the same provider, showed that moderate improvements in care continuity in patients with chronic diseases were associated with substantial improvements in outcomes and decreases in complications and costs.<sup>32</sup> A review assessing the effect of care coordination systems in chronic disease management found positive effects on quality of life, functional status and health outcomes, satisfaction scores, guideline adherence, and compliance.<sup>31</sup> Additionally, routine collection of PROs was shown to be beneficial for patient-provider communication, and for monitoring of treatment response and detecting unrecognized problems in cancer patients.<sup>33</sup> Furthermore, it is shown that healthcare systems organized around primary care are associated with lower healthcare expenditures and that systems with a weak primary care infrastructure are associated with worse health outcomes.<sup>34</sup> The US patient-centered medical home [PCMH] is a model that explores this further. PCMH can be described as a model for care that includes primary care access, comprehensiveness, care coordination, and continuity of care. Hundreds of pilots have been initiated over the USA and the first controlled results suggest improved outcomes, reduced health care utilization, and cost savings, due to initiation of a PCMH.<sup>35</sup>

For IBD specifically, the Royal Adelaide hospital in Australia found a significant decrease in costs and fewer hospitalizations after introduction of a coordinated care infrastructure in a controlled study.<sup>36</sup> Hospitals in the UK, Italy, The Netherlands, Canada, and Austria have been working with integrated care models as well, though no outcomes are presented.<sup>37</sup> The UCLA Center for IBD, launched in 2012, uses an approach that combines all components of coordinated care and

outcome measurements. Multidisciplinary care pathways for IBD were developed and implemented, which include evidence-based practice management, task differentiation and coordination between providers, and collection of outcomes. PROs are collected routinely using a patient-facing mobile application, which is used for patient monitoring and outcome reporting. This process is supported by a solid IT infrastructure, with a provider portal and a patient-facing mobile application [UCLA eIBD, available for iOS and Android]. This infrastructure also facilitates patient-provider communication and education, and offers wellness programs. Healthcare providers can evaluate their patients' outcomes, health care utilization, and associated costs.<sup>12,38</sup> A controlled analysis using a payer database of 49 UCLA IBD Center patients versus 245 IBD controls showed a significant decrease in corticosteroid use from 31% to 12%, and 1.3–3.4 times more frequent biomarker testing. Non-significant decreases in emergency department [ED] visits [75% decrease], hospitalizations [89% decrease], and office visits [25% decrease] were observed as well.<sup>39</sup>

### 2.4 Payment reform to reward value

Value-based insurance design [VBID] is an approach to use insurance models that reward high-value care. Initial efforts were mainly focused on cost-sharing strategies, whereas the value component has only been added in pilots more recently. In the famous RAND health insurance experiment [1974–1982], it was shown already that health care is affected by a certain price elasticity, which is shown by a higher demand for medical care if copayments for patients are lower.<sup>40</sup> However, non-specific cost-sharing strategies target necessary care as well as unnecessary care, which is why the introduction of value in insurance designs is important. The first area in which VBID was implemented was the prescription drug arena. Incentives can be targeted to patients, healthcare professionals, or both. Throughout the Organisation for Economic Cooperation and Development [OECD] member countries, different approaches are already being utilized by governments to stimulate cost-effective drug use using cost sharing strategies. Strategies used to incentivize patients include lowering co-payments or waiving the maximum allowed payment cap for essential medications or generic variants of drugs. Strategies aimed at physicians include compulsory guideline-based prescribing and benchmarking against other physicians, coupled with either financial penalties or rewards.<sup>41</sup>

Patient-targeted approaches include policies that, for example, lower co-payments for high-value drugs specifically, to improve patient adherence. A 2013 paper reviewing 13 studies assessing the effect of reduced co-payments found an increase in quality but no reduction in health expenditure.<sup>42</sup> The majority of studies assessed the effect of reducing co-payments on diabetes and hypertension medication. Reductions of 25–100% in co-payments were found to increase adherence by on average 3% after 1 year. As expected, an increase in prescription drug expenditure was observed for insurers, but overall health expenditure was generally not affected. Two studies evaluated healthcare utilization and found reduction in office visits, ED visits, and hospitalizations. Furthermore, two studies that included disease management with the VBID did observe decreased overall expenditures.<sup>42</sup> Another 2014 review, incorporating 10 studies [of which seven overlap with the previous review], had comparable conclusions and observed an improvement in medication adherence from 2–5 percentage points and lack of evidence for changes in expenditure, outcomes, or healthcare utilization.<sup>43</sup> A more in-depth analysis of 76 VBID plans introduced by a large pharmacy benefit manager found increased adherence in VBID plans that offered more generous benefits, targeted high-risk patients, had wellness programs, and made benefits available only for mail orders. Plans including disease

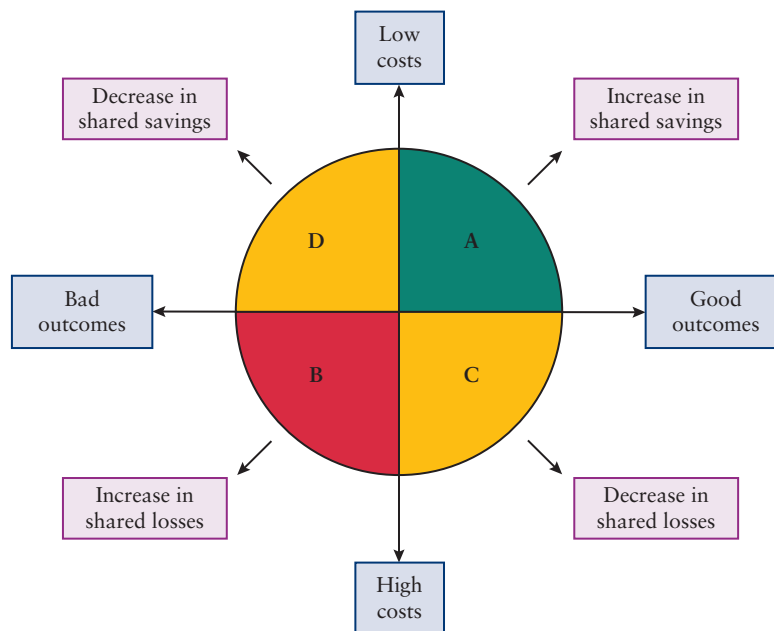
management programs had higher adherence rates, but interestingly enough, disease management programs had a consistently negative effect on adherence improvements after introduction of VBID. The authors conclude this effect might be explained by the fact that VBID and disease management both aim for the same goal, or because baseline adherence was relatively high in those programs and the effect we observe is a ‘ceiling’ effect.<sup>44</sup> A third review assessing the effect of drug insurance cost-sharing strategies for patients with cardiovascular-related chronic diseases confirmed positive effects on adherence rates, although effects on outcomes remained unclear.<sup>45</sup>

Non-pharmacy patient-targeted VBID approaches, mostly targeted at preventive services, are thought to be of high value to the healthcare system. The 2010 U.S. Patient Protection and Affordable Care Act [ACA] requires coverage without cost-sharing of certain preventive health services. Among these services are women’s preventive health services. These include vaccinations, screening, and preventive treatments for certain risk groups.<sup>46,47</sup> Inclusion of secondary preventive services is theoretically of high value as well. However, an analysis from the University of Michigan’s Center for Value Based Insurance Design estimated that addition of certain secondary preventive services in high-deductible health plans would lead to a 5.1–5.6% increase in premiums. Nevertheless, over the long term, including those services is thought to increase health value.<sup>48</sup>

Programs targeting treating physicians are implemented as well. Initial efforts to incentivize performance and accountability among providers are pay for performance programs [P4P], where physicians are rewarded or penalized when reaching certain quality targets—which are usually process measures. Additionally, the ACA allows healthcare providers to form ‘Accountable Care Organizations’ [ACOs]. ACOs are provider organizations organized around primary care, in which all participants are accountable for the quality and outcomes of care. The provider group is eligible to share in healthcare savings with the insurers when they reach certain quality targets. These quality targets are focussed around four domains: patient/caregiver experience, care

coordination and patient safety, preventive health, and care for at-risk populations.<sup>49</sup> Similarly, in different European countries payment reforms are being pursued, including rewards for the introduction of disease management programs in Germany, and bundled payments for episodes of care in The Netherlands.<sup>50</sup> The effect of P4P programs on costs and outcomes is unclear because only few good quality studies are available.<sup>51</sup> Studies mostly show either a null effect or a marginal positive effect. The experience with ACOs and bundled payments incorporating quality incentives is still limited. Reported results on quality measures, outcomes, and costs are mixed, and nine out of 32 CMS ACO contracts were discontinued.<sup>51</sup> Best results are thought to come from bundled payments for episodes of care coupled to quality targets.<sup>4</sup>

In the field of gastroenterology, there is interest in implementation of VBID as well. Saini et al. suggest, as an example, the introduction of higher co-payment for upper endoscopies when the indication is gastroesophageal reflux disease [GERD] than when the indication is dysphagia.<sup>52</sup> We propose to introduce VBID in a comprehensive structure that incentivizes all stakeholders involved in IBD care to utilize high-value care, which includes incentives for insurers, physicians, and patients. Physicians should be rewarded for good performance on a disease-specific level. Using a cost-sharing insurance design, physicians with better outcomes should be at low financial risk, while having more financial benefits, whereas physicians with worse outcomes would have higher risks with lower benefits. This would result in a model in which savings with excellent outcomes are rewarded with a large percentage of shared savings for the provider, savings with suboptimal outcomes are only rewarded with a small percentage of the savings, and savings with bad outcomes are not rewarded at all. On the other side of the spectrum, physicians with high costs and bad outcomes would be penalized by a high percentage of sharing in financial losses, high cost with better outcomes should only be penalized with a smaller percentage in shared losses, and in cases where the provider achieves excellent outcomes, financial penalties should be forgiven [Figure 3]. Expected outcomes should be



**Figure 3.** Proposed value-based insurance design [VBID] mechanism. Providers are incentivized to deliver high-value care by increases in shared savings when delivering better outcomes at lower than expected costs [segment A]. Conversely, providers are disincentivized to deliver low-value care by increases in shared losses delivering worse outcomes at higher than expected costs [segment B]. When delivering better outcomes at higher than expected costs, shared losses will decrease [segment C], whereas when delivering worse outcomes at lower than expected costs, shared savings will decrease [segment D]. Benchmark outcomes and costs are risk-adjusted based on the population mix.



risk-adjusted based on the population mix. This structure is similar to the structure used by the second arm of the Medicare Shared Savings Program.<sup>49</sup> Furthermore, patients should be incentivized to participate in their care. At UCLA, we calculate individual participation scores based on whether patients participate in patient education and home monitoring and comply with scheduled visits, procedures, and tests. We propose that patients should be financially rewarded based on their participation score, which will stimulate better outcomes.

### 3. Conclusion

The introduction of VBHC is inevitable, but approaches on how to achieve value in health care differ. The key concepts include: [1] measurement of outcomes and costs; [2] benchmarking of outcomes and costs; [3] implementation of a value-based clinical system; and [4] the introduction of incentives for delivery of value care. Although the introduction of incentives is mainly in the hands of regulators and insurers, the first three concepts can be driven from within the medical community. Payment reforms are emerging worldwide, and the medical community should be closely involved in the development of these contracts. By implementing the first three components into their practices, providers can improve their care delivery processes and ensure high-value care delivery. These efforts will be rewarded financially as well after the formal introduction of VBID programs. Results on the effects of value-based approaches are still very limited, but many pilot programs are running and initial results are encouraging. We described the approach at UCLA as guidance for implementation of VBHC for care delivery.

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### Conflict of interest statement.

WKD declares no conflict of interest. EE and DWH have a patent Value-Based Health Care Management Systems and Methods issued to UCLA.

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