

Leveraging financial incentives and behavioural economics to engage physicians in achieving quality-improvement process measures

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Background: Dedicated quality-improvement (QI) initiatives within health care systems are of clear benefit, and physicians respond to financial incentivization. The Canadian health care system often lacks this lever, and many financially incentivized QI programs rely on traditional economic principles. We describe our evaluation of financial incentivization for the implementation of QI process metrics in a department of surgery at a Canadian academic hospital system and its impact over a 4-year period.

Methods: Quality-improvement processes informed by extant QI incentivization literature and guided by the principles of behavioural economics were implemented within our institution's Department of Surgery. Disbursement of supplemental government funding was modified to be contingent on the ability of divisions within the department to meet pre-defined QI metrics, including regular multidisciplinary meetings, morbidity and mortality rounds with documented feedback of systemic issues to division members, reviews of adverse events, and implementation of annual patient experience projects. We evaluated the effect of the QI processes from 2015/16 to 2018/19.

Results: There was a significant increase in the number of divisions that satisfied all the QI metrics over the study period, from 2 (28%) in 2015/16, to 5 (71%) in 2016/17, to 7 (100.0%) in 2017/18 and 2018/19 ($p < 0.01$). The application of behavioural economics principles, such as reward versus penalty payoff, loss aversion, payment separation, aligning of values, and relative social ranking, was important to the outcome of the study.

Conclusion: Incentivizing QI activities in the Canadian health care system is possible and led to improvement in QI processes as a whole in our department. This paper lays out a method of financial reimbursement to facilitate engagement of physicians and establishment of a foundation of important QI processes and measures within a department.

Contexte : Les initiatives d'amélioration de la qualité au sein des systèmes de santé présentent des avantages évidents et les médecins sont réceptifs aux mesures d'incitation financière. Ce levier fait souvent défaut dans le système de santé canadien, et de nombreux programmes d'amélioration de la qualité assortis de primes reposent sur des principes économiques traditionnels. Nous décrivons ici notre évaluation des mesures d'incitation financière en vue de la mise en œuvre de paramètres de processus d'amélioration de la qualité dans le département de chirurgie d'un centre hospitalier universitaire canadien et nous examinons les incidences de cette démarche sur une période de 4 ans.

Méthodes : Des processus d'amélioration de la qualité inspirés de la littérature sur l'incitation à l'amélioration de la qualité et reposant sur les principes d'économie comportementale ont été mis en œuvre dans le département de chirurgie de notre établissement. L'octroi du financement gouvernemental supplémentaire a été modifié en fonction de la capacité des divisions du département à respecter des paramètres prédéfinis d'amélioration de la qualité, notamment des réunions multidisciplinaires régulières, des examens réguliers de la morbidité et de la mortalité avec une rétroaction consignée des problèmes systémiques aux membres de la division, des examens des événements indésirables et la mise en œuvre de projets annuels sur l'expérience des patients. Nous avons évalué les effets des processus d'amélioration de la qualité entre 2015–2016 et 2018–2019.

Résultats : Nous avons constaté une augmentation significative du nombre de divisions respectant tous les paramètres d'amélioration de la qualité au cours de la période d'étude (de 2 [28%] en 2015–2016 à 5 [71%] en 2016–2017, puis à 7 [100%] en 2017–2018 et en 2018–2019 [$p < 0,01$]). L'application des principes d'économie comportementale, tels que la récompense par rapport à la pénalité, l'aversion pour les pertes, la séparation des paiements, l'harmonisation des valeurs et le statut social relatif, a joué un rôle important dans les résultats de l'étude.

Conclusion : Les activités d'incitation à l'amélioration de la qualité sont possibles dans le système de santé canadien et ont conduit à un meilleur ensemble des processus d'amélioration de la qualité dans notre service. Cet article présente une méthode de remboursement financier visant à favoriser la participation des médecins et à établir un cadre pour les mesures et les processus importants en matière d'amélioration de la qualité au sein d'un département.

Value-based health care refers to the linkage, at the systems level, of the costs of care delivery to clinical and quality outcomes, rather than strictly to the volume of care delivered. Such an approach, including efforts to minimize use of low-value interventions and costly complications, is critically important to a sustainable health care system. In the United States, costs secondary to complications and services deemed unnecessary total billions of dollars each year.^{1,2} Kerr and Ayanian¹ identified key domains of focus, including the use of financial incentivization and changes to quality management, to address overuse of health care resources.

Many studies have shown the benefits of dedicated quality-improvement (QI) initiatives in all areas of medicine, including surgery.³⁻¹⁰ Therefore, it is important to engage surgeons in QI initiatives as part of a multidisciplinary team, particularly to minimize costly perioperative complications such as surgical site infections. In the United States, where many physicians are employees of hospitals or health care systems, there are specific financial incentives and, at times, obligations for involvement in QI processes.¹¹ The Canadian health care system often lacks this lever, as many physicians are compensated for specific clinical services as independent contractors.

The incentivization of QI often focuses on clinical outcome measures, such as rates of mortality or postoperative bleeding. When process measures are incentivized, they typically refer to clinical activities or decisions, such as the prescribing of acetylsalicylic acid or ordering of mammography.¹¹ There has been limited focus on broader, upstream process measures to improve engagement in and the impact of QI initiatives, rather than improvement in selected clinical outcomes alone. Furthermore, many financially incentivized QI programs rely on traditional economic principles, namely, the notion that increasing incentives will lead to improved performance.^{11,12} This notion assumes that those being incentivized will behave in an expected way.³ The application of behavioural economics attempts to reconcile unexpected responses by identifying systematic means by which one can influence human behaviour based not only on the magnitude of the incentive but also on its design and delivery.^{3,13}

Informed by extant QI incentivization literature and guided by the principles of behavioural economics, we sought to implement specific QI processes within our institution's Department of Surgery. We describe our evaluation of financial incentivization for the implementation of QI process metrics in a department of surgery at a Canadian academic hospital system and its impact over a 4-year period.

METHODS

At our institution, alternative funding beyond fee-for-service reimbursement is given to academic institutions by the provincial government. For surgeons at our institution,

this money flows through the Department of Surgery and was traditionally distributed to each division on a per capita basis. In 2014, in an effort to maximize engagement of surgeons in QI initiatives, a proposal was made to place one-third of the money at risk, with its disbursement contingent on the ability of a division to meet predefined QI metrics. A schedule for graduated amounts of money at risk was implemented by the hospital vice-president, innovation and quality, and the Department of Surgery chair, and agreed on by the department and its constituent divisions: general surgery, neurosurgery, orthopedic surgery, plastic surgery, thoracic surgery, urology and vascular surgery. The schedule is presented in Table 1.

The hospital vice-president, innovation and quality, and the Department of Surgery chair defined 4 QI process metrics for each division to fulfill annually: 1) 6 multidisciplinary meetings during which minutes are to be taken; 2) 4 morbidity and mortality rounds structured in a specific format, with documentation and distribution of lessons learned to the entire division; 3) review of events that are documented in the patient safety learning system (events with potential to cause patient harm or that were perceived to have caused patient harm, and that can be reported by any member of the health care team), with a mechanism to report a summary of events to the division; and 4) implementation of 1 patient experience project. In addition, the department as a whole is responsible for submitting 2 research projects related to QI initiatives each year. Between 2015/16 and 2018/19, the department provided support for creating QI infrastructure within the divisions, helping to provide direction, facilitating patient experience projects, and sharing templates to both conduct and record morbidity and mortality rounds.

A report summarizing each division's fulfilment of these requirements is scored by 2 reviewers from other departments within the Faculty of Medicine. If more than 75% of divisions satisfy the required metrics, 100% of the at-risk funding is disbursed; if 50%–75% of divisions satisfy the required metrics, 50% of the at-risk funding is disbursed; and if less than 50% of divisions satisfy the required metrics, none of the funding is released. If the department does not receive the full funding, the withheld funds are distributed to other departments, including

Table 1. Schedule for graduated funding at risk, by academic year

Year	Amount (%) of money at risk, \$
2015/16	~20 000 (20)
2016/17	23 260 (20)
2017/18	50 835 (30)
2018/19	52 787 (30)
2019/20	53 041 (30)
2020/21	~88 000 (50)
2021/22	~176 000 (100)

medicine, psychiatry, radiology, ophthalmology and family medicine. The Department of Surgery executive agreed that, should the department be unsuccessful in satisfying the QI metrics, the delinquent divisions would bear the loss of funding.

We used the Fisher exact test to evaluate whether there was a significant change in the number of divisions satisfying the QI metrics from 2015/16 to 2018/19. We also performed a Cochran–Armitage test for trend over time as the dependent variable and compliance to QI processes as the independent variable.

Because this study was classified as a QI initiative, it was granted exemption from research ethics board approval by the Ottawa Health Science Network Research Ethics Board.

RESULTS

There was a significant increase in the number of divisions that satisfied all of the QI metrics over the study period, from 2 (29%) in 2015/16, to 5 (71%) in 2016/17, to 7 (100.0%) in 2017/18 and 2018/19 ($p < 0.01$). There was also a significant trend over time in improved compliance ($p < 0.01$).

Importantly, these increases in compliance were coupled with tangible initiatives and improvements in quality management within the Department of Surgery. Specifically, multidisciplinary front-line meetings with documentation of minutes were established; anonymized morbidity and mortality rounds data were documented regularly on centralized, encrypted servers and reviewed by a designated quality lead within each division to identify areas of improvement; and The Ottawa Hospital assisted with the recording and classification of patient safety learning system events. Feedback to division members also improved, with more regular and efficient communication of learning points from rounds and updates on ongoing QI initiatives.

In addition, each division established and appointed a QI lead, who receives funding and is responsible for overseeing and leading front-line staff with respect to QI activities. With this emerging organizational architecture, transdepartmental QI initiatives became more feasible. Specifically, there was review of patient education materials, development of protocols and mechanisms to improve responses to patient telephone calls and queries to surgeons' offices, studies measuring surgeon empathy and introduction of a program to reduce opioid prescribing.

DISCUSSION

Our findings show that incentivizing QI activities in the Canadian health care system is possible and leads to improved engagement in QI processes, with significant increases in fulfilment of QI process measures over time. Leveraging the utility that comes from reimbursement at

the divisional level improves physician engagement and has ensured that multidisciplinary meetings of front-line providers occur on a regular basis in all surgical divisions. Although the reimbursement is not at the individual level, the funds are used to support initiatives, clinical costs and research funding within an individual's division, which can translate into individual benefit, financially or structurally. In our institution, this has led to the targeting of salient issues such as surgical site infection and evidence-informed opioid prescribing, and has resulted in department-wide reductions in surgical site infections, with associated cost savings. We expect that the increased physician engagement will contribute to improved outcomes in areas such as opioid prescribing, surgeon empathy and our most recent endeavour, reducing our carbon footprint.⁴ The infrastructure that has developed has given our department a focus on improving quality of care, which we feel will be sustained.⁵

We believe that application of behavioural economics principles was important to the outcome of our study. They provide a structure around which similar initiatives can be implemented in other institutions. The approach employed at our institution takes advantage of the concept of the reward versus penalty payoff.^{14,15} Specifically, loss aversion has been noted to lead people to expend greater effort to avoid paying a penalty, compared to the amount of effort expended when the incentive is a reward given based on effort.¹⁴ In other words, the response to loss is greater than the response to potential gains, and, in the present case, surgeons worked harder — achieving all QI metrics — when the prospect of losing funding was implemented.^{3,15,16}

The methods that we describe also capitalize on the endowment effect, wherein the at-risk funding is ascribed a higher value simply because it has already been allocated.¹⁷ The risk of negative externality — that is, each division's not seeing the impact of its own short-comings on the department as a whole — was mitigated by applying any financial penalty incurred by the department to the divisions responsible for not meeting the QI metrics. As a result, the potential external costs of poor compliance became internal costs directly related to a division's performance.

Importantly, the at-risk funds were delivered as a separate payment, as opposed to being rolled into the other funding received by the department. In addition, to highlight the importance of the payment to the department, the at-risk funds were given at the time of year when the department Finance Committee meeting was held. Studies of incentivizing patient health behaviours and economic principles have shown that separating incentives from other payments makes the incentive more effective, as the reward becomes more visible and therefore more salient.^{3,12,18} In our department, if the funding had been included with other monies disbursed, the value of QI process adherence may not have been fully appreciated.

Beyond the financial incentivization of the QI process improvements, aligning hospital and departmental missions was key to the success of this approach. The hospital vice-president, innovation and quality, and the Department of Surgery chair were involved in the creation and approval of the metrics, the decision regarding the amount of money at risk and the graduated at-risk funding schedule. It is reasonably intuitive that people are motivated to apply effort toward endeavours they believe are inherently valuable, and Custers and colleagues¹⁹ concluded that incentivization programs must reflect the goals and values of a specific health care system.

The impact of relative social ranking³ may also account for the improvement in QI metrics in our study. People's behaviours are heavily influenced by their perception of how they compare with others,³ and, at our institution, the ability to satisfy the QI metrics is relatively public knowledge insofar as it is reported to members of the various medical and surgical departments within the hospital and is published in the Department of Surgery newsletter. Much of the literature evaluating the impact of public reporting of outcomes has focused on the ability to meet specific clinical outcomes or end points, but an interesting finding has been the effect of performance reporting on QI: hospitals that reported their patient care performance data also had larger numbers of QI activities in progress at their institution.^{20,21} The resultant conclusion is that public, or peer-level, reporting of outcomes may stimulate further QI initiatives.

Although the notion of financial incentivization as a means to improve care quality is not novel, the existing literature pertaining to incentivization of physician behaviour focuses primarily on rewarding or penalizing attainment of patient outcomes or clinical tasks.^{11,16,22–26} There have been efforts to incentivize more upstream QI approaches, such as that of Powers and colleagues²⁷ describing “financial rewards for undertaking and scaling pilots” in various care areas, but much of the financial framework that they describe focuses on clinical processes and targets. Furthermore, several meta-analyses and systematic reviews have shown variable success with traditional incentivization models.^{16,23–26} A need to move beyond traditional incentivization has been expressed, and the principles of behavioural economics have been presented as a way to enhance incentives.^{28,29}

We specifically incentivized QI process engagement. However, development of QI initiatives as a sequela of financial incentivization of clinical outcomes has been shown previously. Introduction of financial rewards or penalties for certain outcomes or complications led to providers' increasing their involvement in activities directed toward QI, outcome reporting and enhancing patients' experience.^{30–35} Interestingly, in our study, there appeared to be a sustained effect over the 4-year period, whereas a group in Saudi Arabia observed poor sustainability of non-

financially incentivized performance-improvement processes over only 9 months.³⁶ It is possible that the monetary incentive is required to maintain outcomes.²²

In Canada, research into additional financial incentivization beyond traditional single-payer fee-for-service or salary compensation has been limited to traditional incentivization, with monetary rewards linked to clinical markers.³⁷ Concerns have been raised about unfair or inappropriate delivery of financial rewards in the Canadian health care system,³⁸ but our study mitigates those concerns by placing at-risk funds already made available to the Department of Surgery, as opposed to diverting new funding from other sources. Behavioural economics as a means to enhance financial rewards has been studied in the context of incentivizing patient behaviours,³⁹ but, to our knowledge, no Canadian study has yet applied the principles of behavioural economics to physician behaviours.

Embedding QI within systems of care is essential, and this paper lays out a method of financial reimbursement to facilitate engagement of physicians and establishment of a foundation of important QI processes and measures within a department. We outlined the principles of behavioural economics that contributed to the success of the funding changes at our institution. Other institutions could implement similar changes to drive QI engagement. Specifically, implementing similar funding structures to support QI process engagement in other provinces holds the potential to drive further QI efforts nationally, which may improve care for all Canadian patients. Furthermore, the amount of funding at risk was relatively small compared to departmental funding as a whole, which suggests that the changes we describe could also be implemented at institutions without large volumes of external funding, regardless of their primary method of physician compensation. Research is underway at our institution to continue to evaluate the relation between incentivization of QI engagement and improved clinical outcomes for surgical patients.

Limitations

Our QI incentivization program was implemented at a single academic hospital system in Canada. Therefore, given differences in means of health care funding across international and provincial borders, our strategy may not be feasible or applicable in all jurisdictions. Our institution receives provincial funding that can be applied to such endeavours as QI, which may not be possible in smaller institutions or community hospitals. Future research could focus on the impact of financial incentivization of QI processes as it relates to baseline physician compensation methods, such as fee-for-service or salary structures. The financial incentivization described in this study is not directed at individual physicians, so although individuals may benefit from increased funding to their division, the impact of incentives and penalties for QI process measures

at the individual level requires further exploration. In addition, the observed improvements in QI process engagement were multifactorial. In addition to modifying financial incentives in keeping with behavioural economics principles, the Department of Surgery leadership structure, the designated QI leads, the hiring of new surgeons, who may have had more awareness of QI during the study period, and institutional support for QI likely contributed to the success as well. However, we feel that the changes to financial incentivization were the primary drivers and advocate for this approach to support sustainable adherence to QI processes.

CONCLUSION

Providing supplemental funding to surgical divisions contingent on the ability to satisfy predetermined QI process measures in accordance with principles of behavioural economics resulted in an increased number of surgical divisions within a hospital system's achieving these measures, as well as an increase in QI activities within the Department of Surgery. This study shows the feasibility of targeted financial incentives at the divisional, rather than the individual, level to stimulate QI engagement. The findings may serve as a catalyst for driving improvements in measurable clinical outcomes and stimulating future research.

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