

# Effect of reinforced audit and feedback intervention on physician behaviour: a multifaceted strategy for targeting medical record documentation

Z Meidani<sup>1</sup>, M Farzandipour<sup>2</sup>, A Davoodabadi<sup>3</sup>, A Farrokhian<sup>4</sup>, D Kheirkhah<sup>5</sup>, M Sharifi<sup>6</sup>, ME Khanghahi<sup>7</sup>

## Abstract

We investigated the effects of reinforced audit and feedback on the medical record documentation (MRD) of 35 surgical residents at a tertiary university hospital. In three phases (pre intervention, 3 and 9-month post intervention), 525 medical records were assessed. An educational guideline assisting residents to record more accurate MRD was developed. The MRD rate in the pre-intervention and immediate post-intervention phases had changed significantly. The MRD rate in the pre-intervention and 9 months after cessation of intervention was not statistically significant. Reinforced audit and feedback had only a short term effect on MRD. To achieve long lasting change, we suggest residents' MRD behaviour must be integrated in their periodic clinical performance evaluation and reinforced through positive feedback including incentive mechanisms.

**Keywords:** documentation, feedback, incentive, medical records, motivation, reinforced

**Declaration of interests:** No conflict of interests declared

## Correspondence to:

M Farzandipour  
Health Information  
Management Research  
Center  
Department of Health  
Information Management &  
Technology  
Kashan University of Medical  
Sciences  
Kashan  
Iran

## Email:

farzandipour\_m@kaums.ac.ir

## Introduction

Medical records document patient care, are an integral component in the quality of patient care and are essential for management of diseases and public health promotion.<sup>1,2</sup> Despite their importance, medical record documentation (MRD) is one of the main challenges facing the healthcare systems.<sup>3,4</sup> MRD is unpopular among nurses and physicians and is undervalued compared to direct patient care.<sup>5</sup> Attention has been focused on surgical MRD due to its great impact on reimbursement, patient safety, legal and risk management.<sup>6,7</sup> From a financial point of view, poor quality of surgical information within medical records can lead to significant financial losses and denial of insurance.<sup>8,9</sup> MRD is clearly a vital aspect of physicians' behaviour and merits evaluation and improvement through well-established mechanisms.<sup>10,11</sup> Because of the very limited effect of educational interventions on MRD, audit and feedback (A&F) was introduced as a strategy to change physicians' behaviour.<sup>12</sup> Evidence suggests that A&F has a significant impact on changing the behaviour of physicians and is considered to be one of the best approaches to improve professional behaviour and performance in healthcare organisations.<sup>13,14</sup> This study aimed to investigate the effects of multifaceted mechanisms on the improvement of medical records documentation prepared by surgical residents at a tertiary university hospital.

## Methods

### Study Setting and Population

The study was conducted at a 510 bed tertiary care university hospital affiliated to Kashan University of Medical Sciences (KAUMS), Iran, in 2014. Thirty-five surgical residents participated in the research.

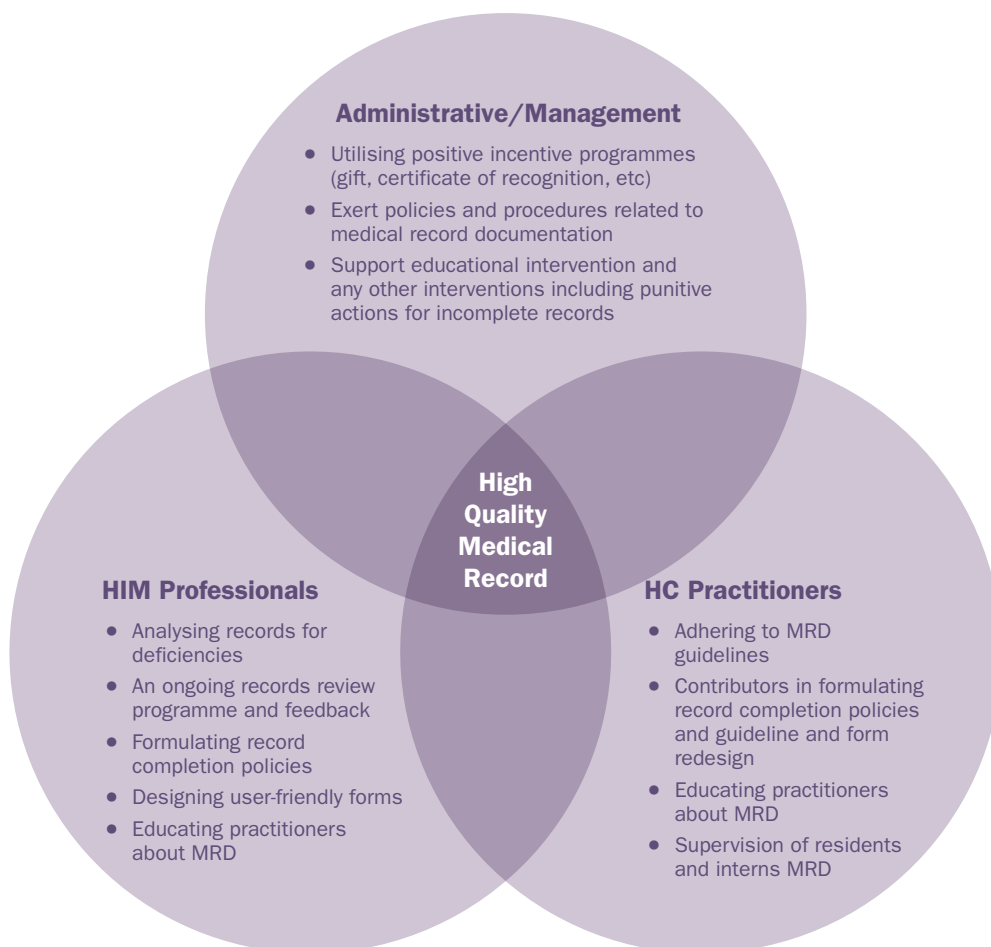
### Study protocol

#### *Need for campaign on improved medical record documentation (IMRD)*

This study was the second phase of a large campaign at KAUMS to improve documentation and completion of medical notes. Our previous research has suggested chart-based educational training was not an effective strategy to change a physician's behaviour in chart documentation.<sup>12</sup> We believed that IMRD required several strategies such as educational interventions, reinforced with the support of committees, strong leadership and regular feedback. This study was conducted to determine the effectiveness of a combination of strategies including education, A&F and incentives on physicians' chart documentation.

<sup>1,2</sup>Associate Professor, Health Information Management Research Center, <sup>3</sup>Associate Professor, Department of Surgery, <sup>4</sup>Associate Professor, Department of Cardiology, <sup>5</sup>Associate Professor, Infectious Diseases Research Center, Kashan University of Medical Sciences, Kashan, Iran; <sup>6</sup>Hematology & Oncology (MD), Shahid Beheshti Hospital, Kashan University of Medical Sciences, Kashan, Iran; <sup>7</sup>Assistant Professor, Department of Health Sciences and Health Education, Iran University of Medical Sciences, Tehran, Iran

**Figure 1** Interactions of the three components of the medical record documentation (MRD) triangle



*Conducting a quality improvement cycle on medical record documentation*

To adopt this multifaceted strategy a Quality Improvement Committee (QIC) comprising the hospital president, hospital chief executive officer, director of hospital medical education, head of medical groups and health information management professionals was formed. The QIC decided to implement a pilot study to investigate the effectiveness of multifaceted strategies on IMRD. Because of the importance of surgical notes on reimbursement, patient safety and legal matters, the surgery department was selected for the pilot study. The head of surgery department was selected as facilitator to drive IMRD among residents.

Surgical resident MRD was assessed using a checklist at three time points: before, 3 months after the intervention and 9 months after cessation of the intervention. Fifteen medical records of each of the 35 surgical residents (525 medical records) were reviewed.

*Medical record review*

In the initial phase, randomly selected medical records were reviewed using a generic record review form, a two section checklist.<sup>15</sup> The first section covered background information including age, sex, and patient record number. The second section covered history and physical exam (5 items), progress notes (4 items), admission and discharge (2 items), and the operation note (7 items). Any item that was

accurately recorded was graded 1, and 0 for any that was not recorded. Medical records were assessed by two reviewers who were blinded to the identity of the recording resident or intervention. The same chart review process was applied at 3 and 9 months after the intervention.

*Developing the intervention*

Previous work has established that high quality medical records are realised through the interaction of three interrelated building blocks.<sup>12</sup> These three interactive entities, the ‘medical record documentation triangle’, are healthcare practitioners, health information management professionals and administrative and management support.

We used several strategies including A&F, education, and incentives to cover all three building blocks (Figure 1). A&F was employed as the main strategy to improve physician MRD behaviour, strengthened with incentives and education to address various components of MRD. Feedback referred to information about the performance of an individual from an outside source; feedback was conducted in two forms: positive feedback (reinforcing or positive) and negative (constructive or corrective).<sup>13,14</sup> Positive feedback utilised a variety of positive incentives including monetary (pay-for-performance, gift cards, and bonuses) and non-monetary (flexible working hours, vacation days) approaches to reinforce targeted behaviour.<sup>16,17</sup> To amplify the impact of the A&F intervention, an educational guideline assisting residents

**Table 1** Frequency distribution of residents' grade

Resident Year	n	%
I	9	25.71
II	8	22.86
III	10	28.57
IIII	8	22.86
<b>Total</b>	<b>35</b>	<b>100</b>

to record more accurate MRD was also developed. The role of MRD in patient care and hospital revenue was highlighted in a 1 hour lecture.

#### Implementing the interventions

Source of feedback – The head of the surgery department worked as a facilitator and rater for residents' MRD. He presented a lecture about the importance of MRD in patient care and hospital revenue. The focus of the QIC on MRD improvement with residents' contributions was fully explained. An educational guideline for accurate MRD, based on a minimum data set for each medical record form, was distributed to the residents. During the meeting, the forthcoming assessment of MRD was highlighted by the head of the department. The same process was undertaken 3 and 9 months after the intervention.

Format of feedback – Positive feedback in term of monetary incentives (gift cards) and non-monetary (recognition for best practices) were employed. There was personal feedback in which the performance of each resident was presented at grand round sessions twice during 6 months.

Content of feedback – We selected peer comparisons to give feedback; MRD rates were assessed for each resident and those with the highest score in each year of residency were incentivised. Graphical as well as numerical data were provided to indicate best practice in MRD to the participant.

#### Impact of intervention cessation on continuity of physicians MRD behaviour

Given that previous literature suggested behaviour changes have a relationship with ongoing feedback,<sup>18</sup> MRD behaviour was assessed 9 months after the end of the intervention.

### Data analysis

The Kolmogorov-Smirnov test was applied to evaluate normal distribution. To measure the documentation proportion in pre-intervention phase, post-intervention phase and 9 months after cessation, a paired t-test for non-normal data and the Wilcoxon non-parametric test were also used.

The research was approved by the Ethical Review Board of Kashan University of Medical Sciences. Residents' consent was not obtained because: i) documenting medical records is clinically incumbent upon residents, thus they were only informed about the evaluation of MRD behaviour, ii) residents were not informed of the type of intervention.

**Table 2** Frequency distribution of residents' grade

Medical Record Forms	Pre-intervention p value	Post-intervention p value	Pre-intervention and after cessation p value
History	0.449	0.335	0.375
Progress Note	0.345	0.330	0.335
Admission & discharge	0.324	0.406	0.465
Operation note	0.710	0.852	0.772
<b>Total</b>	<b>0.410</b>	<b>0.691</b>	<b>0.996</b>

All information about the outcome of the investigation was confidential and used solely by the investigating team. Reviewers were blind to the aim of the intervention and identity of the recording resident.

### Results

The majority of participants in this study were male (28; 80%) and well distributed across the four years of residency (Table 1).

There was no significant relationship between degree of residents and rate of medical record documentation ( $p = 0.996$ ) (Table 2).

Table 3 suggests that the highest rate of MRD in all phases was attributed to the item 'chief complaint' from history and physical exam form 157 (100%). The lowest rate of MRD in three phases was provided in items 'assessment' and 'plan' in disease progress notes 0 (0%).

The results of three phases of study were provided through the separate subheadings (Table 4).

#### MRD before the intervention

Baseline data (before intervention) showed that the highest rate of MRD was in the history and physical exam ( $3.6 \pm 0.68$ ) and operation note ( $3.03 \pm 0.45$ ). The lowest rate of MRD was in disease progress notes ( $0.65 \pm 0.48$ ) and admission and discharge ( $0.88 \pm 0.69$ ).

#### MRD 3 months after the intervention

The operation note ( $4.93 \pm 1.0$ ) and history and physical exam ( $4.4 \pm 0.50$ ) were the best recorded aspects of the MRD rate. The progress note ( $1 \pm 0.0$ ) and admission and discharge ( $1.52 \pm 0.56$ ) were the poorest. The greatest MRD improvement was the operation note from ( $3.03 \pm 0.45$ ) to ( $4.93 \pm 1.0$ ). The smallest improvement was the disease progress note from ( $0.65 \pm 0.48$ ) to ( $1 \pm 0.0$ ). Residents' MRD improvement from the pre-intervention to the post-intervention phases was statistically significant ( $p = 0.000$ ).

**Table 3** Frequency distribution of MRD pre and post-intervention, and 9 months after the cessation of intervention

Medical Record Forms	Items	Pre-intervention		Post-intervention		Pre-intervention and after cessation	
		Yes n (%)	No n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)
History and physical exam	Chief Complete	175 (100)	0 (0)	175 (100)	0 (0)	175 (100)	0 (0)
	Medical History	157 (89.71)	18 (10.28)	175 (100)	0 (0)	175 (100)	0 (0)
	Family history	61 (34.85)	114 (65.14)	70 (40)	105 (60)	43 (24.57)	131 (74.85)
	Past medical history	148 (84.57)	27 (15.42)	175 (100)	0 (0)	82 (46.85)	93 (53.14)
	Physical exam	88 (50.28)	87 (49.71)	175 (100)	0 (0)	166 (94.85)	9 (5.14)
Progress Note	Subjective	0 (0)	175 (100)	0 (0)	175 (100)	0 (0)	175 (100)
	Objective	113 (64.57)	62 (35.42)	175 (100)	0 (0)	122 (69.71)	53 (30.28)
	Assessment	0 (0)	175 (100)	0 (0)	175 (100)	0 (0)	175 (100)
	Plan	0 (0)	175 (100)	0 (0)	175 (100)	0 (0)	175 (100)

**Table 4** Scores for MRD pre and post-intervention, and 9 months after the cessation of intervention

Subject	Pre-intervention	Post-intervention	Pre and post intervention		After cessation of intervention	Pre-intervention and after cessation	
	Mean/SD	Mean/SD	T-test	p value	Mean/SD	T-test	p value
History & physical exam	3.6(±0.68)	4.4(±0.50)	-4.292	0.000	3.85(±0.81)	-1.314	0.204
Progress note	0.65(±0.48)	1(±0.0)	-3.199	0.005	0.70(±0.47)	-0.370	0.716
Admission and discharge	0.88(±0.69)	1.52(±0.56)	-6.048	0.000	1.16(±0.49)	-0.466	0.643
Operation note	3.03(±0.45)	4.93(±1.0)	-6.953	0.000	3.24(±0.60)	-1.290	0.2
<b>Total</b>	<b>8.16(0.57)</b>	<b>11.85(±1.32)</b>	<b>-6.645</b>	<b>0.000</b>	<b>8.95(±0.59)</b>	<b>-1.588</b>	<b>0.112</b>

**MRD 9 months after the intervention**

The best completed parts of the MRD 9 months after cessation of intervention were the history and physical exam ( $3.85 \pm 0.81$ ) and operation note ( $3.24 \pm 0.60$ ); disease progress note ( $0.70 \pm 0.47$ ) was poorest. There was no sustained improvement in residents' MRD 9 months after cessation of the intervention ( $p = 0.112$ ).

This study investigated the effect of feedback reinforced by incentive and education on surgical residents' MRD in a tertiary university hospital. MRD improved after our intervention. Our results are consistent with previous studies. Axon et al. found that documentation of the discharge summary sheet increased from 70% to 82% after providing individual and team feedback.<sup>19</sup> Bischoff et al., using monetary incentives and ongoing feedback, showed that documentation rate of physicians improved and continued

for 6 months after cessation of interventions.<sup>20</sup> Martens et al. found that the financial incentives were an effective strategy for changing the prescribing behaviour in general practitioners.<sup>21</sup> Eccles et al. reported that A&F and reminder messages, improved primary care radiology referrals.<sup>22</sup> Not all previous studies have been positive; Baker et al. attributed failure to the short duration of feedback.<sup>23</sup>

We believe that our strategy combining A&F, an incentive mechanism and education was beneficial. A previous study has shown that a multiple strategy approach boosts the effect of A&F.<sup>24</sup>


The influence of positive feedback (incentive) serves as another major contributing factor in the acceptance and success of A&F intervention in the current study. Previous studies have reported that when feedback was delivered in a positive manner, it is easily accepted and successfully incorporated into the clinical setting.<sup>25</sup> Punitive (non-incentive/negative) feedback may also lead to performance improvement, but is less welcome. Negative feedback can cause emotional distress, negative effects on the recipient's self-image, motivation and subsequent performance.<sup>26,27</sup> For this reason, it is recommended to provide negative feedback in 'feedback sandwich' format. In this way, the piece of negative feedback is 'sandwiched' between two layers of positive feedback to make any negative points more palatable.<sup>28</sup>

We believe that A&F, when supported by physicians, is more likely to be professionally accepted by medical communities.<sup>29</sup> Our study was part of an internally-driven quality improvement process with active involvement of all members of the surgery department under the leadership of the head of surgery. His leadership served as another catalyst to improve the acceptance of the feedback and enhance performance.<sup>25</sup> Feedback may only be perceived as useful when the raters (colleagues or co-workers) understand the environment and have experience of either working with participants or observing their practice.<sup>30</sup>

There was however a lack of a sustained improvement at 9 months; Eisenberg claims the impact of educational programmes on physicians' laboratory test ordering was unstable.<sup>31</sup> Others suggest that habit serves as the main barrier for changing physicians' behaviour.<sup>32</sup> Bunting et al. believed that feedback should be ongoing to lead in behaviour change.<sup>18</sup> Therefore, to be effective, feedback should be delivered regularly.

Similar to previous literature, the effect of our monetary incentive as an extrinsic incentive diminished after its removal.<sup>33</sup> To ensure the long lasting effect of incentives on physicians' behavior we recommend future studies focus on intrinsic incentives which could improve internal motivation and satisfaction.<sup>34</sup>

## Conclusion

Our A&F intervention, strengthened with incentives and education, led to improvement of residents' documentation. However, the improvement was not sustained after the cessation of the intervention. To achieve the long-lasting behaviour change we recommend: i) MRD performance should be reviewed at residents' periodic clinical performance evaluations and feedback be reported to residents and other stakeholders; ii) positive incentives should be focused on intrinsic incentives which are more likely to have a sustainable impact on performance. 

## Acknowledgement

We would like to express our gratitude for those who participated in this study.

## References

- Safdari R, Meidani Z. Developing a model for an Iranian Classification of Diseases (IRCD) compatible with other adaptations of the International Classification of Diseases. *HIM J* 2007; 36: 36–41.
- Azar FE, Masoori N, Meidani Z et al. Proposal for a modernized Iranian notifiable infectious diseases surveillance system: comparison with USA and Australia. *East Mediterr Health J* 2010; 16: 771–7.
- Fortney CA, Steward DK. Medical record documentation and symptom management at the end of life in the NICU. *Adv Neonatal Care* 2015; 15: 48–55.
- Echaiz JF, Cass C, Henderson JP et al. Low correlation between self-report and medical record documentation of urinary tract infection symptoms. *Am J Infect Control* 2015; 43: 983–6.
- Farzandipour M, Meidani Z, Riazi H et al. Nursing Information Systems Requirements: A Milestone for Patient Outcome and Patient Safety Improvement. *Comput Inform Nurs* 2016; 34: 601–12.
- Barritt AW, Clark L, Cohen AM et al. Improving the quality of procedure-specific operation reports in orthopaedic surgery. *Ann R Coll Surg Engl* 2010; 92: 159–62.
- Frishman GN. Standardized photographic surgical documentation – a picture is worth a thousand words. *Fertil Steril* 2013; 99: 1209–10.
- Fakhry SM, Robinson L, Hendershot K et al. Surgical residents' knowledge of documentation and coding for professional services: an opportunity for a Focused educational offering. *Am J Surg* 2007; 194: 263–7.
- Hahey JR, Tully M. The rewards of accurate clinical documentation. *Healthc Financ Manage* 2008; 62: 34–7.
- Johnson G, Booth J, Crossley J et al. Assessing trainees in the workplace results of a pilot study. *Clin Med* 2011; 11: 48–53.
- Spencer J. Learning and teaching in the clinical environment. *BMJ* 2003; 15: 326: 591–4.
- Farzandipour M, Meidani Z, Rangraz Jeddi F et al. A pilot study of the impact of an educational intervention aimed at improving medical record documentation. *J R Coll Physicians Edinb* 2013; 43: 29–34.
- Mullan CJ, Pagoti R, Davison H et al. An audit of consent for allograft use in elective orthopaedic surgery. *Ann R Coll Surg Engl* 2016; 98: 254–7.

- 14 Fraser KD, Sales AE, O'Rourke HM et al. Data for improvement and clinical excellence: protocol for an audit with feedback intervention in home care and supportive living. *Implement Sci* 2012; 7: 4.
- 15 Ciampa M, Revels M. *Introduction to Health Information Technology*. Boston, MA: Cengage Learning; 2012.
- 16 Fletcher DM. *Best Practices in Medical Record Documentation and completion*. AHIMA Practice Brief; 1999.
- 17 Mahoney ME, Schiller MR, Johns ML. The effects of positive incentive programs on physician chart completion. *Top Health Rec Manage* 1990; 11: 40–53.
- 18 Bunting PS, Van Walraven C. Effect of a controlled feedback intervention on laboratory test ordering by community physicians. *Clin Chem* 2004; 50: 321–6.
- 19 Axon RN, Penney FT, Kyle TR et al. A hospital discharge summary quality improvement program featuring individual and team-based feedback and academic detailing. *Am J Med Sci* 2014; 347: 472–7.
- 20 Bischoff K, Goel A, Hollander H et al. The Housestaff Incentive Program: improving the timeliness and quality of discharge summaries by engaging residents in quality improvement. *BMJ Qual Saf* 2013; 22: 768–74.
- 21 Martens JD, Werkhoven MJ, Severens JL et al. Effects of a behavior independent financial incentive on prescribing behaviour of general practitioners. *J Eval Clin Pract* 2007; 13: 369–73.
- 22 Eccles M, Steen N, Grimshaw J et al. Effect of audit and feedback, and reminder messages on primary-care radiology referrals: a randomised trial. *Lancet* 2001; 357: 1406–09.
- 23 Baker R, Falconer Smith J, Lambert PC. Randomised controlled trial of the effectiveness of feedback in improving test ordering in general practice. *Scand J Prim Health Care* 2003 ; 21: 219–23.
- 24 Ivers NM, Sales A, Colquhoun H et al. No more 'business as usual' with audit and feedback interventions: towards an agenda for a reinigorated intervention. *Implement Sci* 2014; 17: 9: 14.
- 25 Ferguson J, Wakeling J, Bowie P. Factors influencing the effectiveness of multisource feedback in improving the professional practice of medical doctors: a systematic review. *BMC Med Educ* 2014; 14: 76.
- 26 Steelman LA, Rutkowski KA. Moderators of employee reactions to negative feedback. *Journal of Managerial Psychology* 2004; 19: 6–18.
- 27 Cardador MT. The effects of positive versus negative impact reflection on change in job performance and work-life conflict. *Front Psychol* 2014; 5: 1370.
- 28 Back AL, Arnold RM, Baile WF et al. The art of medicine: when praise is worth considering in a difficult conversation. *Lancet* 2010; 376: 866–7.
- 29 Veloski J, Boex JR, Grasberger MJ et al. Systematic review of the literature on assessment, feedback and physicians' clinical performance: BEME Guide No. 7. *Med Teach* 2006; 28: 117–28.
- 30 Payne VL, Hysong SJ. Model depicting aspects of audit and feedback that impact physicians' acceptance of clinical performance feedback. *BMC Health Services Research* 2016; 16: 260.
- 31 Eisenberg JM. An educational program to modify laboratory use by house staff. *J Med Educ* 1977; 52: 578–81.
- 32 Scraggs E, Brereton L, Newbould J et al. *Factors that encourage or discourage doctors from acting in accordance with good practice*. London: General Medical Council; 2012. [http://www.gmc-uk.org/Barriers\\_and\\_enablers\\_of\\_good\\_practice\\_\\_\\_final\\_research\\_report.pdf\\_50388604.pdf](http://www.gmc-uk.org/Barriers_and_enablers_of_good_practice___final_research_report.pdf_50388604.pdf) (accessed 21/8/17).
- 33 Conrad DA, Perry L. Quality-based financial incentives in health care: can we improve quality by paying for it? *Annu Rev Public Health* 2009; 30: 357–71.
- 34 Gallani S. *Incentives, Peer Pressure, and Behavior Persistence*. Harvard Business School Accounting and Management Unit. April 2017. [https://www.insead.edu/sites/default/files/assets/dept/aa/ac/docs/Gallani\\_Paper.pdf](https://www.insead.edu/sites/default/files/assets/dept/aa/ac/docs/Gallani_Paper.pdf) (accessed 21/8/17).