

## Implementing human factors in clinical practice

Timmons, Stephen; Baxendale, Bryn; Buttery, Andrew; Miles, Giulia; Roe, Bridget; Browes, Simon

DOI:

[10.1136/emmermed-2013-203203](https://doi.org/10.1136/emmermed-2013-203203)

License:

Creative Commons: Attribution-NonCommercial (CC BY-NC)

*Document Version*

Publisher's PDF, also known as Version of record

*Citation for published version (Harvard):*

Timmons, S, Baxendale, B, Buttery, A, Miles, G, Roe, B & Browes, S 2015, 'Implementing human factors in clinical practice', *Emergency Medicine Journal*, vol. 32, no. 5, pp. 368-372. <https://doi.org/10.1136/emmermed-2013-203203>

[Link to publication on Research at Birmingham portal](#)

### General rights

Unless a licence is specified above, all rights (including copyright and moral rights) in this document are retained by the authors and/or the copyright holders. The express permission of the copyright holder must be obtained for any use of this material other than for purposes permitted by law.

- Users may freely distribute the URL that is used to identify this publication.
- Users may download and/or print one copy of the publication from the University of Birmingham research portal for the purpose of private study or non-commercial research.
- User may use extracts from the document in line with the concept of 'fair dealing' under the Copyright, Designs and Patents Act 1988 (?)
- Users may not further distribute the material nor use it for the purposes of commercial gain.

Where a licence is displayed above, please note the terms and conditions of the licence govern your use of this document.

When citing, please reference the published version.

### Take down policy

While the University of Birmingham exercises care and attention in making items available there are rare occasions when an item has been uploaded in error or has been deemed to be commercially or otherwise sensitive.

If you believe that this is the case for this document, please contact [UBIRA@lists.bham.ac.uk](mailto:UBIRA@lists.bham.ac.uk) providing details and we will remove access to the work immediately and investigate.



## OPEN ACCESS

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/emmermed-2013-203203>).

<sup>1</sup>Faculty of Medicine, School of Health Sciences, Queen's Medical Centre University of Nottingham, Nottingham, UK

<sup>2</sup>Department of Anaesthetics, Nottingham University Hospitals NHS Trust, Nottingham, UK

<sup>3</sup>Trent Simulation & Clinical Skills Centre, Nottingham University Hospitals NHS Trust, Nottingham, UK

<sup>4</sup>Nottingham University Business School, University of Nottingham, Nottingham, UK

<sup>5</sup>CNCS group Leicester, Leicestershire & Rutland, UK

## Correspondence to

Dr Stephen Timmons, Faculty of Medicine, School of Health Sciences, Queen's Medical Centre, University of Nottingham, Nottingham NG7 2UH, UK; [stephen.timmons@nottingham.ac.uk](mailto:stephen.timmons@nottingham.ac.uk)

Received 10 September 2013

Revised 13 January 2014

Accepted 25 January 2014

Published Online First

14 March 2014



Open Access  
Scan to access more  
free content



CrossMark

**To cite:** Timmons S, Baxendale B, Buttery A, *et al.* *Emerg Med J* 2015;**32**:368–372.

# Implementing human factors in clinical practice

Stephen Timmons,<sup>1</sup> Bryn Baxendale,<sup>2</sup> Andrew Buttery,<sup>3</sup> Giulia Miles,<sup>3</sup> Bridget Roe,<sup>4</sup> Simon Browes<sup>5</sup>

## ABSTRACT

**Objectives** To understand whether aviation-derived human factors training is acceptable and useful to healthcare professionals. To understand whether and how healthcare professionals have been able to implement human factors approaches to patient safety in their own area of clinical practice.

**Methods** Qualitative, longitudinal study using semi-structured interviews and focus groups, of a multiprofessional group of UK NHS staff (from the emergency department and operating theatres) who have received aviation-derived human factors training.

**Results** The human factors training was evaluated positively, and thought to be both acceptable and relevant to practice. However, the staff found it harder to implement what they had learned in their own clinical areas, and this was principally attributed to features of the informal organisational cultures.

**Conclusions** In order to successfully apply human factors approaches in hospital, careful consideration needs to be given to the local context and informal culture of clinical practice.

## INTRODUCTION

It is becoming more widely acknowledged that there is 'value' associated with developing a greater awareness of human factors (HF) among healthcare staff in terms of improving patient safety in their clinical practice. In depth, qualitative studies of the implementation of interventions based on this approach remain rare. A recent comprehensive literature review of patient safety research in the UK<sup>1</sup> suggests that '[human factors] ideas and concepts might benefit from adaptation and translation before being applied' (p. 28) and that there is a 'need for multi and mixed methods approaches to researching patient safety'. This study will therefore examine in detail the application of an HF approach in two departments in a large acute hospital. An HF approach considers the interplay between the healthcare staff providing care (people and culture) and the organisational and clinical contexts in which this care is delivered (systems and processes). It helps describe and explain the limitations and potential fallibility of human performance within complex socio-technical systems and links to broader contexts of organisational performance and risk management. The HF approach views causation of critical incidents and unplanned events in clinical practice as being a complex interplay between systemic and environment factors in the workplace and various well described (and normal) limitations in human performance, rather than being 'errors' made by blameworthy individuals.

## Key messages

## What is already known about this subject

- The human factors approach to patient safety, derived from aviation, has been widely used in healthcare, including the emergency department. It has been shown to be effective.
- However, there has been no study that evaluates its acceptability to clinicians, or its sustainability in clinical practice.

## What this study adds

- Aviation based human factors training is both acceptable, and perceived as useful, for emergency department and operating theatre clinicians.
- In the long term, it may prove hard to sustain in a UK NHS context.

The aviation HF approach has been enthusiastically embraced within healthcare, especially in the UK NHS,<sup>2,3</sup> though this is not without its critics.<sup>4</sup> While there is strong evidence that this is an effective approach in improving patient safety,<sup>5</sup> there is less evidence about implementation and acceptability to professional staff in healthcare.<sup>6,7</sup> Both Greenhalgh *et al*<sup>8</sup> and Dixon-Woods *et al*<sup>9</sup> show that the implementation of organisational innovations in healthcare is a complex process and prone to failure. Opposition from professional groups has proven to be a major obstacle to some of these innovations<sup>10</sup> and it is thus important to establish how the aviation HF approach is viewed by professional staff in hospital, in this case, staff who took part in an HF training programme.

## CURRENT POLICY CONTEXT

This study is particularly timely in the UK NHS policy context. The initial report<sup>11</sup> on poor quality of care at the Mid-Staffordshire Hospitals NHS Trust showed that (among other criticisms) poor communication and teamworking, inadequate clinical and managerial leadership, and an organisationally widespread lack of focus on patient care caused a catastrophic collapse in patient safety and the quality of care. The second report,<sup>12</sup> focused on the wider organisational context, has made similar criticisms. The reports of the Clinical Human Factors Group<sup>13</sup> and the Department of Health Human Factors Reference Group<sup>14</sup> both show the importance of the HF approach in addressing these issues.



## THE INITIATIVE

HF has been successfully applied in the aviation industry, but whether it can be translated to healthcare, particularly the UK NHS context, has been questioned in the literature.<sup>4</sup> This paper reports on an initiative which sought to apply the HF approach to clinical practice in the main operating theatres and emergency department (ED) in one UK NHS Trust. This Trust is in the Midlands of England and serves a population of 3 million. In 2012–2013 there were 110 000 admissions, 125 000 operations and 181 000 ED attendances. A group of senior professionals (consultant physicians and surgeons, experienced qualified nurses and theatre practitioners; n=20, 13 male, 7 female) were trained over 6 days by experts in HF from aviation to act as interprofessional faculty for HF training. Recruitment was by invitation, though there were no selection criteria other than seniority and experience. None of the 'faculty' group has any formal training in HF prior to this initiative.

### Box 1 Human factors (HF) course outline

#### Day 1 and 2

Aim: To raise awareness about HF in healthcare

#### Objectives

- Introduce the concept and vocabulary of HF
- Establish the relationship between HF, individual and team performance and patient safety
- Describe the value of error reporting and analysis as part of the organisational risk management framework
- To look at briefings as part of Situation Awareness
- To explore effective communication
- To review the concept of Emotional Intelligence
- To establish that personality is not the same as behaviour
- To review the characteristics of effective teamwork and leadership
- To consider ways of developing team members skills and enhancing team performance

#### Day 3 and 4

Aim: To interpret exemplar events from clinical practice using an HF framework

#### Objectives

- Analysis of incidents: where does HF appear?
- Describing individual and team behaviours objectively
- Recognising and managing stress and complexity
- Developing effective communication in the workplace
- Briefing, debriefing and feedback skills

#### Day 5 and 6

Aim: To develop and use techniques for active observation and objective feedback, consider some of the broader organisational and strategic issues which influence patient safety. To formulate and prioritise ideas for changes in practice in the workplace.

#### Objectives

- Describe different models of decision making in clinical practice
- Highlight the various national, organisational, departmental and patient/public priorities which influence strategies for improving patient safety
- Develop priorities for local changes in practice which aim to improve patient safety
- Describe techniques that support implementing and sustaining change

Members of the faculty group then delivered a 6-day HF training programme to professional staff from ED and theatres (box 1).

Participants in this, the first course to be delivered (n=19, 6 male, 13 female), were included in this study. This initiative was clinically-led, and while the management of the hospital were aware of the HF programme, and supportive, they were not centrally involved in it.

## METHODS

The project was deemed by the relevant NHS research and development department to constitute service evaluation, and ethical approval was not necessary. Nonetheless, the research team ensured that written information about the study was provided to all participants, that written consent was taken, and that anonymity and confidentiality were maintained throughout.

Both faculty and course participants were drawn from the ED and operating theatres, and consisted of a range of clinicians including both senior and junior medical and nursing staff. Two focus groups (both of six participants, mixed in both profession and area of practice) were conducted with the first group of faculty during the initial training course, using the same topic guide (see online supplementary appendix A). They lasted an hour and were facilitated (alone) by one of the research team (ST, who has 20 years' experience as a qualitative researcher, including extensive facilitation of focus groups) and recorded.

Ten semi-structured interviews were conducted with the faculty, and 11 with participants in the first course (for interview schedule, see online supplementary appendix B). Some faculty were therefore in a focus group and had a one-to-one interview. Interviews with faculty and course participants were conducted approximately 3 months after the programme had finished. This was a deliberate choice by the research team in order to establish how far the faculty and participants had been able to utilise the HF approach in their everyday practice and the interview schedule reflected this. All faculty and participants were invited to interview, and the sample reflects those who agreed to participate. Interviews were conducted by SB and BR, both of whom are experienced qualitative interviewers. No participant had prior contact with the research team, though they were provided with written information about the study in advance. The interviews and focus groups were transcribed, transcription checked against recordings, and then analysed thematically. This involved a process of coding for meaning and content, and then building themes by linking groups of codes together. This was done by one researcher (ST) and the initial analysis checked and agreed at a meeting of the whole research team. There was no validation of interviews or themes by

**Table 1** Participants and level of agreement with themes

Theme	Level of agreement, faculty	Level of agreement, course participants
Evaluation	Everyone	Everyone
'Trying to do it'	Majority	Majority
The social context	Majority	Majority
Barriers to implementation	Everyone	Everyone
Whether HF was a professional or managerial activity	Some	Some
HF, human factors.		

faculty or course participants, though the themes discussed by faculty and participants were similar (table 1).

## RESULTS

The main themes that emerged were evaluation, 'trying to do it', the social context, barriers to implementation and whether HF was a professional or managerial activity.

### Evaluation

The programme was generally positively evaluated:

The best course I've ever done. (surgeon, faculty)

Bold and ambitious. (ED doctor, participant)

It gave the participants new ways of thinking about things and new ways of talking about them, such as situation awareness. Though there was uncertainty about 'what HF was' prior to joining the programme, after initial discussions common issues became clear. Prior to starting the programme, both faculty and participants were looking for new perspectives on long-term problems. Everyone found that the programme gave them the new insights that they hoped for. For some this was a major achievement: 'a miracle' and 'amazing'. Bringing the tacit knowledge to the surface was a recurrent theme, with thoughts of 'why the hell haven't we been doing it like that?' (operating theatre nurse, participant). However, it has to be acknowledged that this, by virtue of the way the participants were recruited, is a self-selected sample of HF enthusiasts.

### Tried to do it

All of the participants reported that they tried to put what they had learned into action, though it appears from the data that more senior participants had a wider scope to do this. Among the activities they reported were:

- ▶ Thinking more about specificity in language.
- ▶ Leadership and support for colleagues.
- ▶ Being approachable to junior staff members.
- ▶ Asking for feedback from colleagues.
- ▶ Embed HF into other areas of work, such as mentorship and teaching.
- ▶ Re-focus on the importance of teamwork.
- ▶ Clarifying their role and responsibilities to themselves as well as others.

What these activities have in common is that they are largely focused on the individual's own work, rather than being attempts to influence their wider department or unit. This is linked to some of the contextual factors discussed below.

### The social context

The social context proved to be a significant factor in interviewees' accounts. There were notable differences between the ED and theatres. In the ED participants reported a sense of dilution and loss of momentum since the programme:

Nothing we thought we wanted to do has been introduced or developed in any way, shape or form. (ED doctor, participant)

This was attributed to problems of people working in isolation and participants returning to established cultures and communities of practice. In theatres there was perceived to be more of a natural fit with the way that things work anyway. Natural teams formed around individual theatres and the methodical, process nature of anaesthesia and surgery.

Differences related to the status and role of participants were also apparent. Senior staff appeared to integrate HF better into

their roles, and they did not see a clear distinction between professional and leadership or management responsibilities. More junior staff saw management as something that was done by others.

### Barriers to implementation

Despite the participants' enthusiasm for the HF approach, and their attempts to implement it in their work, they perceived that there were substantial barriers to using it effectively. These were situated in organisational structures and cultures, and included a general unwillingness to change ways of working, especially if they were thought to involve additional work.

There was the handovers idea, which has stalled, I think is the best way of putting it, because there are so many other competing demands on my time. I think the problem with innovation in the NHS generally is there's no support for it. No-one really gives a monkey's (sic). (ED nurse, participant)

It was difficult to fund and protect time for training other staff in HF. The participants' accounts when focused on their own areas of practice were largely positive. Talking about the meso and macro levels tended to elicit negative discussion around organisational problems, issues with 'management' and resourcing this work properly to enable it to be effective and continue. The concepts of HF were accepted but making changes was seen as a different matter. Concern was expressed that it was still limited to a few people in a couple of areas and therefore within the organisation it was relatively hidden and risked losing momentum. While broader managerial issues were raised as significant barriers, it is these deep-seated more cultural phenomena that were thought by participants to be more significant.

### Is HF work a professional or managerial activity?

Participants found it difficult to separate the two:

I think everybody needs to have some understanding at least of human factors because it has an impact on any level of the NHS. (senior nurse, ED, participant)

Well, it's not managerial ... I think it should be part of our day to day; it should be the foundation for everything we do at the sharp end. (theatre practitioner, faculty)

HF was seen as integral to roles at all levels, and was considered by participants to be part of professional self-regulation. However, a rather vaguely-defined 'management' were seen as having the organisational influence and resources to enable HF. The 'management' were perceived as having:

absolutely no concept about human performance at all. (senior nurse, ED, participant)

## DISCUSSION

### Acceptability and barriers to implementation

An HF initiative, derived explicitly from an aviation approach to HF, was found to be both acceptable and useful by a wide, albeit not totally representative, group of clinical staff. This is an encouraging finding, given the lack of qualitative evaluations of this approach in healthcare, and concern that it may not be appropriate. A key factor in its success appears to have been that the initiative was clinically-led, delivered largely by clinicians, and that management in the hospital appears to have taken a supportive, but 'hands-off' stance.

However, this needs to be balanced against the reported difficulties that participants had in putting HF into practice in a



complex environment, which is usually held to be resistant to change.<sup>15</sup> For all that this initiative fulfilled many of the criteria for success delineated by Greenhalgh *et al*,<sup>8</sup> it appears to have encountered similar difficulties in implementation to other service improvement initiatives. The issues related either to organisational structure, that the hospital is a large, complex, bureaucratic organisation, or to the (informal) organisational culture<sup>16</sup> which is not necessarily conducive to this kind of change. The data do contain some suggestions from participants about how these perceived organisational barriers might be overcome. First, they thought that it would be helpful if there had been a more structured and extensive follow-up to the HF programme, enabling them to continue to meet as a group for mutual support, and to discuss ideas about how some of the barriers might be overcome, possibly on a community of practice model.<sup>17</sup> This has been implemented by the HF training course since this study was done. Second, for all that the disengaged but supportive stance of the hospitals' management was helpful in ensuring the acceptability of the HF initiative, participants realised that they needed much more active support from managers, both local and corporate, in order to bring about the kinds of changes that they sought in their own workplaces. They thought that managers needed to facilitate the development of an HF approach by allowing the release of staff to attend training, funding that training, and, where necessary, funding some of the initiatives that had arisen from the HF work. Third, participants were of the view that the HF approach would work much better if all staff had received HF training, including, in this context, the highest levels of senior management to the most 'junior' staff and students.

### Professional or managerial activity

The question of whether HF work is a professional activity or a managerial one is interesting, and it has a substantial bearing on the success and sustainability of HF initiatives like the one studied in this paper. Though the issue of doctors (in particular) acting as managers has been discussed in the literature, and some of the tensions about how this relates to ideas about being 'professional' have been delineated, this has not been considered in the context of HF. In addition, the clinically-led nature of the HF initiative studied here may have led to it being perceived differently by professionals, rather than, as many service improvement initiatives are, being imposed by the hospital's management.

A range of findings on this issue are presented in the literature from doctors who have embraced managerial roles, such as the GPs studied by Pickard,<sup>18</sup> who shows how the medical profession has been, as she terms it, reprofessionalised, 'incorporating a new series of managerially defined competencies and a new type of clinical autonomy' (p. 255). In the GPs studied, these changes were viewed quite positively. Likewise, Jones and Green<sup>19</sup> and Kirkpatrick *et al*<sup>20</sup> also show how doctors have increasingly become involved in management. The doctors and nurses studied by McDonald *et al*<sup>21</sup> found their managerial role more ambivalent, and Iedema *et al*<sup>22</sup> found tensions between acting as clinician and manager. While these more ambiguous or nuanced positions appear common in the literature, there is also evidence of outright resistance.<sup>22</sup>

The clinicians we studied exhibited some of the ambiguity found by McDonald *et al*.<sup>21</sup> While they were generally enthusiastic about leading HF work, they became more ambivalent if it led them into more formally 'managerial' activity, and this seemed problematic for some of them. Despite the new forms of more organisational professionalism analysed by, for instance,

Evetts,<sup>23</sup> there was still a residual resistance by clinicians to work that could be perceived (by themselves or others) as 'managerial'. This phenomenon would also explain some of the quite strongly held views that many issues that were relevant to HF were the responsibility of the 'management', and not clinicians. So, for all that this HF initiative was clinical in origin, clinically-led, and facilitated by clinicians, if it led practitioners in a direction that appeared more directly managerial, then this was a problem. This quite deep-seated concern about managerial work may prove to be an obstacle to the development of HF in healthcare.

### Organisational culture

What is perhaps surprising in our findings, given the emphasis that the HF approach gives to issues like 'the authority gradient', was that they remained problematic for the clinicians involved. For all that the senior staff who had been through the programme sought to be, for instance, more approachable, they were aware that their seniority remained an obstacle to certain issues being raised with them. Likewise, more junior staff felt that, despite change being perceptible, they did not feel able to challenge senior staff on some issues. The fact that only a minority of staff in both ED and operating theatres had undertaken the HF training tended to exacerbate this problem. We would thus caution against the HF approach being seen as a 'quick fix' for organisational culture. In healthcare, organisational cultures can be long-standing, and thus obdurate, and it appears that they can be an issue in HF implementation as much as in any other service improvement initiative, for all that HF attempts to address these issues head-on. These findings also confirm the importance of HF being a component of undergraduate curricula.<sup>24</sup>

### Limitations

These include the fact that this study was done at a single Trust, and that only one investigator conducted the focus groups. The selection process for the HF training may have biased the comments.

### CONCLUSION

The aviation approach to HF proved to be usable and acceptable to participants. Despite its perceived strengths, it appears to have come up against many of the obstacles that other organisational change initiatives in the NHS, and healthcare more broadly, have encountered. In the light of the strong policy push (outlined above) for the widespread adoption of the HF approach in healthcare in the UK, this paper contains important practical lessons for healthcare providers, educational institutions and individual professionals. HF is a meaningful and useful toolkit for professionals interested in service improvement. However, the organisational context needs to be right for HF to be fully effective, and this should not be underestimated.

**Acknowledgements** Thanks to Professor Justin Waring, and the participants and faculty in the HF programme.

**Contributors** ST designed and led the research, and wrote this paper. BB designed and led the Human Factors initiative, and contributed to the design and management of the research study. AB was a participant on the Human Factors initiative, and analysed the data. GM managed the Human Factors initiative. BR and SB conducted the interviews, and analysed the data.

**Funding** University of Nottingham School of Health Sciences.

**Competing interests** None.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Open Access** This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 3.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/3.0/>

## REFERENCES

- 1 Waring J, Rowley E, Dingwall R, *et al*. Narrative review of the UK Patient Safety Research Portfolio. *J Health Serv Res Policy* 2010;15(Suppl 1):26–32.
- 2 Toff NJ. Human factors in anaesthesia: lessons from aviation. *Brit J Anaesth* 2010;105:21–5.
- 3 Armitage G. Human error theory: relevance to nurse management. *J Nurs Manag* 2009;17:193–202.
- 4 Catchpole K. Spreading human factors expertise in healthcare: untangling the knots in people and systems. *BMJ Qual Saf* 2013;22:793–7.
- 5 Catchpole KR, Dale TJ, Hirst DG, *et al*. A multicenter trial of aviation-style training for surgical teams. *J Patient Saf* 2010;6:180–6.
- 6 Russ AL, Zillich AJ, McManus MS, *et al*. A human factors investigation of medication alerts: barriers to prescriber decision-making and clinical workflow. *AMIA Annu Symp Proc* 2009;2009:548–52.
- 7 Voss JD, May NB, Schorling JB, *et al*. Changing conversations: teaching safety and quality in residency training. *Acad Med* 2008;83:1080–7.
- 8 Greenhalgh T, Robert G, Macfarlane F, *et al*. Diffusion of innovations in service organisations: systematic review and recommendations. *Milbank Q* 2004;82:581–629.
- 9 Dixon-Woods M, McNicol S, Martin G. Ten challenges in improving quality in healthcare: lessons from the Health Foundation's programme evaluations and relevant literature. *BMJ Qual Saf* 2012;21:876–84.
- 10 Timmons S. Nurses resisting information technology. *Nurs Inq* 2003;10:257–69.
- 11 Francis R. *Independent inquiry into care provided by Mid Staffordshire NHS Foundation Trust January 2005–March 2009*. London: HMSO, 2010.
- 12 Francis R. *Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry*. London: The Stationery Office, 2013.
- 13 Clinical Human Factors Group. 'Never'; report on never events. [http://www.chfg.org/wp-content/uploads/2012/03/Never\\_Events\\_Corrected\\_Final\\_VersionApril12.pdf](http://www.chfg.org/wp-content/uploads/2012/03/Never_Events_Corrected_Final_VersionApril12.pdf) (accessed 27 Mar 2013).
- 14 Department of Health. Human Factors Reference Group Interim Report. <http://www.chfg.org/news-blog/dh-human-factors-group-interim-report-and-recommendations-for-the-nhs> (accessed 27 Mar 2013).
- 15 Plamping D. The NHS's 50 anniversary: change and resistance to change in the NHS. *BMJ* 1998;317:69–71.
- 16 Davies HT, Mannion R, Nutley SM. Organisational culture and quality of health care. *BMJ Qual Saf* 2000;9:111–19.
- 17 Wenger E. *Communities of practice: learning, meaning, and identity*. Cambridge: Cambridge University Press, 1998.
- 18 Pickard S. The professionalization of general practitioners with a special interest: rationalization, restratification and governmentality. *Sociology* 2008;43:250–67.
- 19 Jones L, Green J. Shifting discourses of professionalism: a case study of general practitioners in the United Kingdom. *Sociol Health Ill* 2006;28:927–50.
- 20 Kirkpatrick I, Jespersen P, Dent M, *et al*. Medicine and management in a comparative perspective: the case of Denmark and England. *Sociol Health Ill* 2009;31:642–58.
- 21 McDonald R, Harrison S, Checkland K. Identity, contract and enterprise in a primary care setting: an English general practice case study. *Organization* 2008;15:355–70.
- 22 Iedema R, Degeling P, Braithwaite J, *et al*. 'It's an interesting conversation I'm hearing': the doctor as manager. *Organ Stud* 2004;25:15–33.
- 23 Evetts J. Professionalism: past, present and future. *Comp Sociol* 2011;10:1–37.
- 24 Glavin RJ, Maran NJ. Integrating human factors into the medical curriculum. *Med Educ* 2003;37(s1):59–64.