



**NHS** *North West*

# **Junior Doctor Advisory Team**

**Patient safety and quality of care continue to  
improve in NHS North West following early  
implementation of the European Working Time  
Directive**

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**Title: Patient safety and quality of care continue to improve in NHS North West following early implementation of the European Working Time Directive.**

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## **ABSTRACT**

### Objectives/Hypothesis

NHS Northwest fully implemented the European Working Time Directive (EWTD) one year ahead of the August 2009 national deadline. Significant debate has taken place concerning the implications of the EWTD for patient safety. This study aims to directly address this issue by comparing parameters of patient safety in NHS Northwest to those nationally prior to EWTD implementation, and during 'Northwest-only' EWTD implementation.

### Design/setting

Hospital standardised mortality ratio (HSMR), average length of stay (ALOS), and standardised readmission rate (SRR) in acute trusts, across all specialties were calculated retrospectively throughout NHS Northwest for the three financial years from 2006/2007 to 2008/2009. These figures were compared to national data for the same parameters.

### Results

The analysis of HSMR, ALOS and SRR reveal no significant difference in trend across three financial years when NHS Northwest is compared to England. HSMR and SRR within NHS Northwest continued to improve at a similar rate to the England average after August 2008. The ALOS analysis shows that NHS Northwest performed better than the national average for the majority of the study period, with no significant change in this pattern in the period following August 2008. When the HSMRs for NHS Northwest and England are compared against a fixed benchmark year (2005) the data shows a continuing decrease. The NHS Northwest figures follow the national trend closely at all times.

### Conclusions

The data presented in this study quantitatively demonstrates, for the first time, that implementation of the EWTD in NHS Northwest in August 2008 had no significant impact

on key outcomes associated with patient safety and quality of care. Continued efforts will need to be focused on the challenge posed nationally by the restricted working hour's schedule.

## INTRODUCTION

Since August 2009, doctors in training in the United Kingdom have been required by law to work an average of no more than 48 hours per week, calculated over a 26 week reference period. The legislation underpinning this originated from Europe in 1993 and was originally termed the European Working Time Directive (EWTD). This directive was incorporated into UK law in 1998 under the Working Time Regulations (WTR) but the restriction of doctors' working hours was gradually implemented, allowing an incremental reduction to 48 hours by the August 2009 deadline.

Constant debate has taken place concerning the implications of the EWTD for patient safety and junior doctor training. Although the initial intention of the legislation was to improve patient and doctor safety through reduction in working hours, concerns regarding the threat to quality of training, service provision and continuity of care have been aired with regularity. Alongside this, the implicit concern that patient safety could be adversely affected has received widespread press coverage [1, 2, 3, and 4]. However there is no robust evidence to uphold the viewpoint that the adoption of a restricted working hours schedule will impair patient safety, directly or indirectly.

Conversely, there is a substantial body of evidence supporting the reduction in doctors working hours precisely *because* this improves patient safety and reduces serious medical error; a number of studies conducted in the United States in recent years provide evidence for increased serious medical errors in those working prolonged shifts compared to those undertaking restricted hours [5, 6]. Similarly, an incremental increase in adverse patient safety incidents with successive prolonged shifts, especially night-shifts, has been well demonstrated [7], objectively confirming what had been anecdotally reported for many years. In light of this, the Royal College of Physicians Multidisciplinary Working Group published guidance in 2006 which recommended the cessation of traditional working practises involving blocks of seven 13 hour night shifts, and endorsed a limit of four successive night shifts that should be minimised in length where possible [8]. A prospective study, recently undertaken in the UK, has demonstrated a marked decrease in medical error rates amongst doctors working in an EWTD compliant rota when directly compared to a group undertaking a traditional 56 hour per week working pattern [9]. Moreover, the 2009 postgraduate medical education and training board

(PMETB) national survey of trainees provides robust evidence that trainees operating within the WTR's 48 hour limit are significantly less likely to report serious error [10]

The EWTD was not the first package of measures which aimed to restrict working hours for doctors; The New Deal, agreed in 1991, stipulated maximum shift lengths, maximum weekly working hours (depending on shift type), and outlined minimum rest requirements [11]. This package embodied the viewpoint that junior doctors, alongside other workers, were entitled to adequate work/life balance, and epitomised the wider perspective that 'tired doctors are not safe doctors' [12]

The actual implementation of an average 48-hour working week represented a significant challenge to the organisation and provision of clinical services across the country; in recognition of this, and in order to lead the way in EWTD implementation, NHS Northwest undertook a project to fully implement the EWTD one year ahead of the August 2009 deadline [13]

Although there is now an accumulation of evidence to support the viewpoint that patient safety is positively impacted by restricted working hours amongst doctors, there are no objective data examining quantitative parameters of patient safety in an environment where the EWTD limit is implemented. The unique circumstances existing in the UK from August 2008 allow us to compare the performance of an EWTD compliant region (NHS North West) to the rest of England, which had not yet implemented the 48 hour limit; these circumstances allow us to test the unsupported hypothesis that patient safety could be harmed by the introduction of the WTR's 48 hour limit. Accordingly, this study aims to directly address the question of patient safety in respect of the EWTD by comparing parameters of patient safety in NHS Northwest to those nationally, prior to EWTD implementation, and during 'Northwest-only' EWTD implementation. In devising this study, we considered hospital standardised mortality ratio (HSMR), average length of stay (ALOS), and standardised readmission rate (SRR) in acute trusts, across all specialties, to be suitable quantitative indicators of patient safety and quality of care [13, 14, 15].

## **METHODS**

Data for this study was collected and analysed by Dr Foster Intelligence: the information is based on data which is routinely collected from day-case and inpatient records throughout the NHS. These data were then extracted for analysis by the Dr Foster Unit at Imperial College London through the secondary users service (SUS). The data were cleaned and anonymised according to established hospital episode statistics (HES) guidelines. HSMR, ALOS and SRR across NHS Northwest were analysed retrospectively for the three financial years 2006/2007 to 2008/2009 (effectively April 2006 to March 2009). These figures were compared to national data for the same parameters. No individual patients were identifiable in this study.

The HSMR compares the number of expected deaths with the number of actual deaths in a ratio [(observed deaths / expected deaths) \* 100.] The HSMR analysis was performed for acute trusts only, across all specialties. The expected counts are derived using logistic regression and are adjusted for factors to indirectly standardise for difference in case mix, including:

- Sex,
- Age group (in five year bands up to 90+),
- Method of admission (non-elective or elective),
- The socio-economic deprivation quintile of the area of residence of the patient (based on the Carstairs Index [16]),
- Primary diagnosis (based on the Clinical Classification System ),
- Co-morbidities (based on Charlson Score [17]),
- Number of previous admissions,
- Month of admission (for certain conditions where seasonal variation may be important, e.g. respiratory infection),
- Whether a patient is being treated within the specialty of palliative care.

A published methodology for calculation of HSMRs was utilised, however a detailed description of this methodology is beyond the scope of this paper and can be found in our references [18].



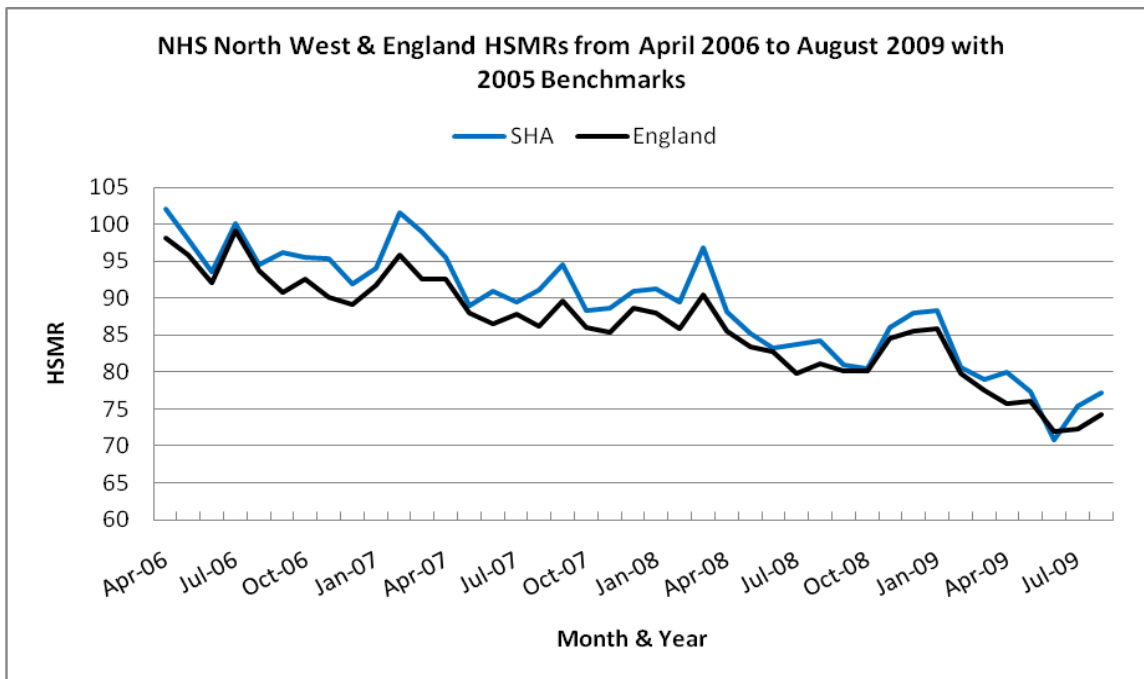
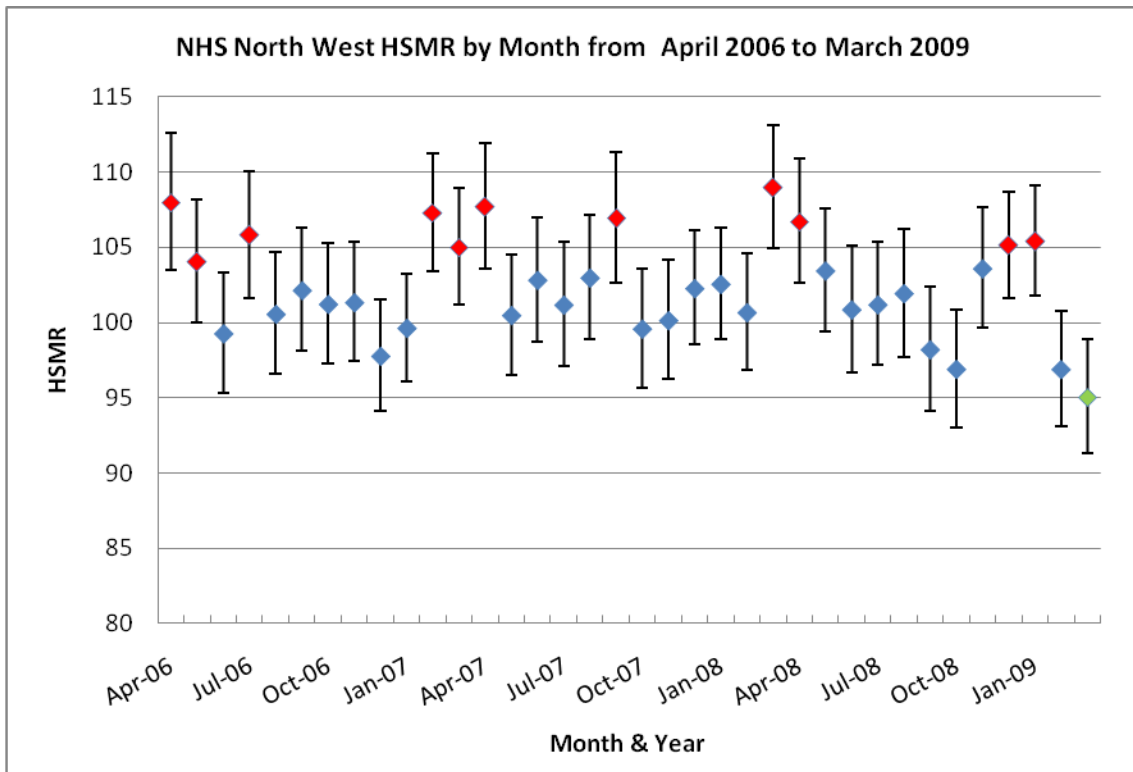
The length of stay analysis (ALOS) measures the average duration of all patient episodes in hospital across acute trusts, across specialties, from the day of admission to the day of discharge, divided into elective and non-elective groups [14].

The standardised readmission rate (SRR) analysis takes into account the number of emergency readmissions to acute trusts across specialties within 28 days of discharge, where readmission was not part of the planned treatment. The rate is calculated by dividing the observed readmissions by the expected readmissions. Both are indirectly standardised for the following factors [15]:

- Age on admission (in five year bands up to 90+)
- Sex
- Admission method (non-elective or elective)
- Socio-economic deprivation quintile of the area of residence of the patient (based on the Carstairs Index)
- Primary diagnosis (based on the Clinical Classification System )
- Co-morbidities (based on Charlson Score)
- Year of discharge (financial year)

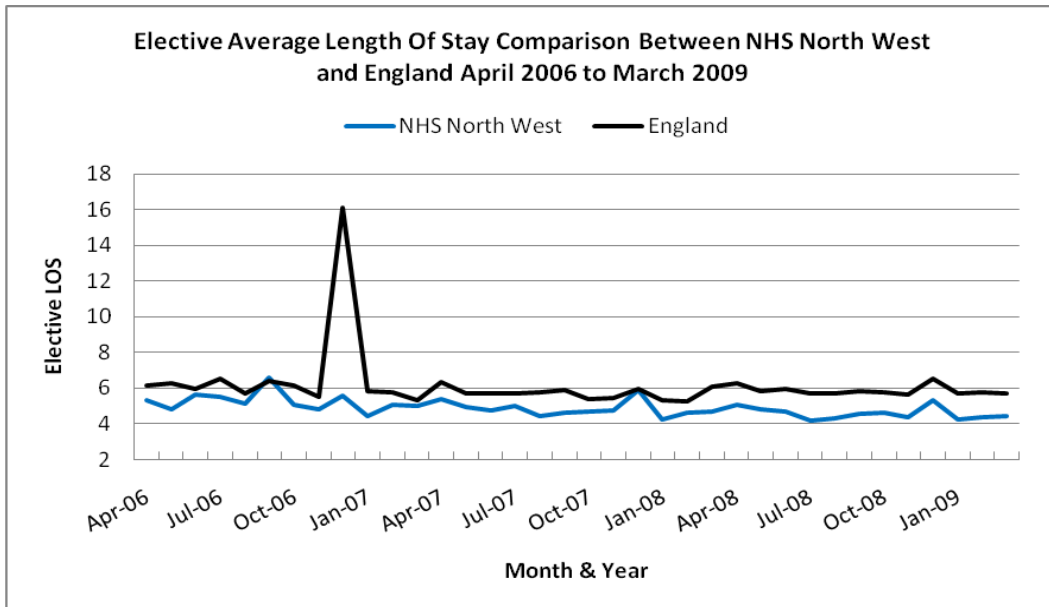
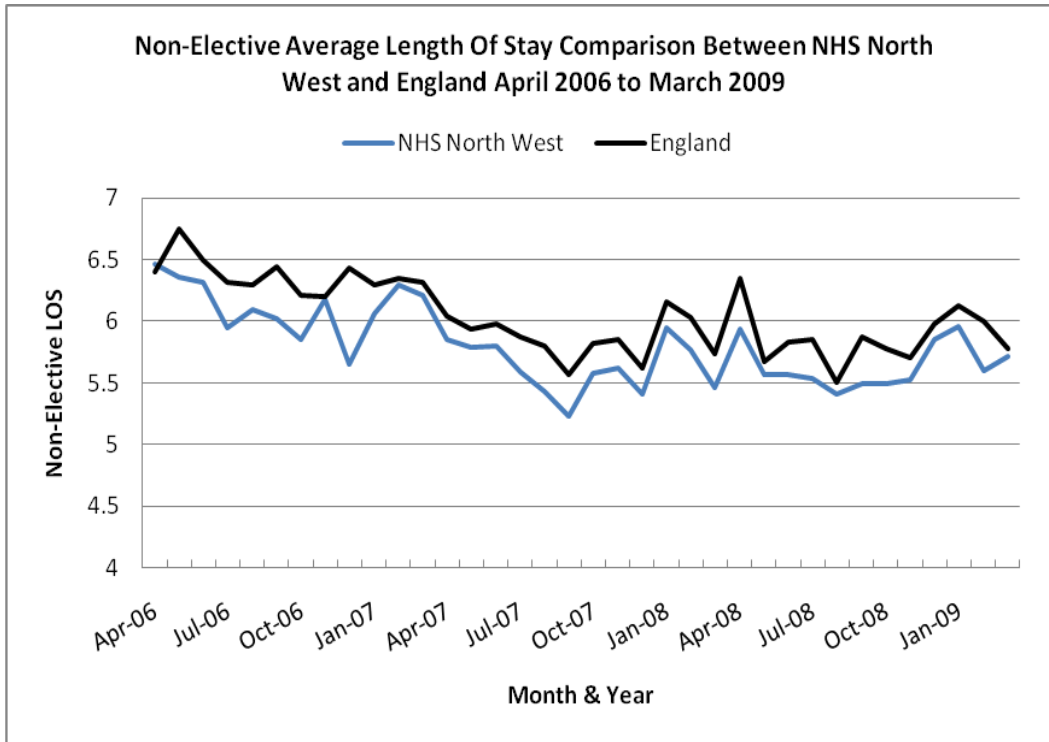
## **RESULTS**

The HSMRs by month for NHS Northwest and England are included in table form with associated confidence intervals (Table 1 and 2). When the HSMR analysis for NHS Northwest is plotted alongside the national trend a similar pattern for both can be seen throughout the period of analysis. The green markers show where the HSMR is statistically low in a given month and red markers show where the HSMR is statistically high (Figure 1). When the HSMRs for NHS Northwest and England are compared against a fixed benchmark year (2005) the data shows a continuing decrease (Figure 2). The NHS Northwest figures follow the national trend closely at all times.

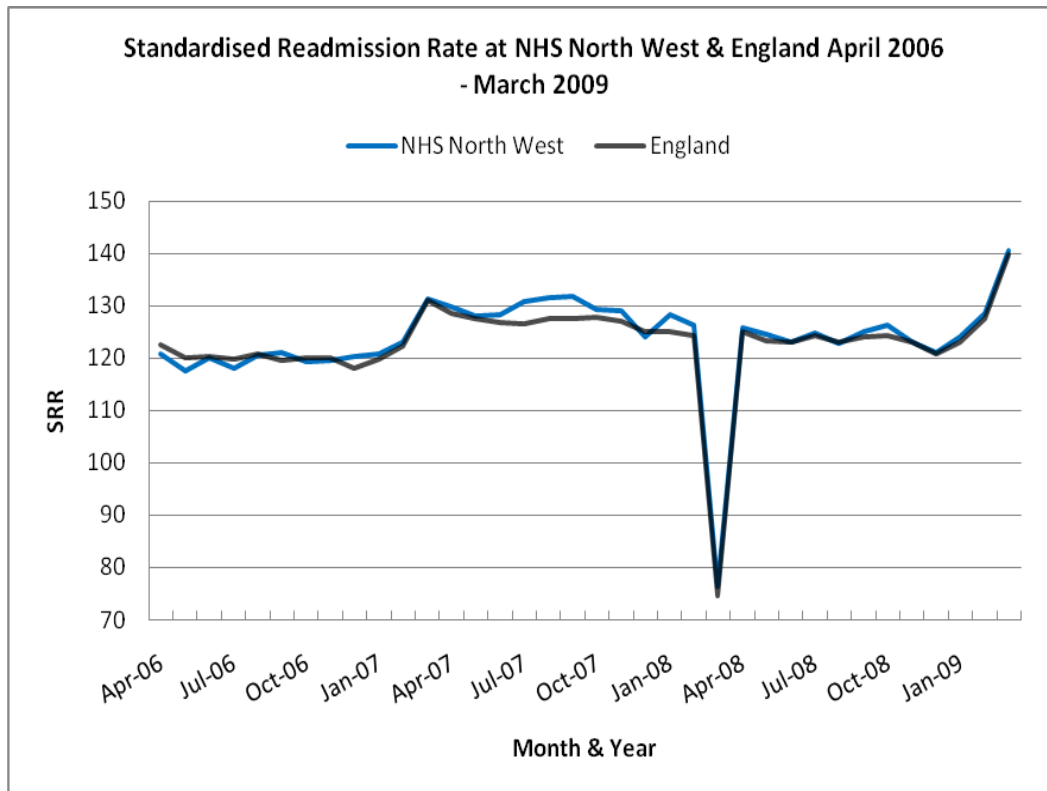


The ALOS by month for NHS Northwest and England are included in table form with associated confidence intervals (Table 3 and 4). When the ALOS for elective and non-elective patients across NHS Northwest is plotted alongside the national trend, once again a similar pattern for both can be seen throughout the period of analysis

(Figure 3 and 4)



The SRR by month for NHS Northwest and England are included in table form with associated confidence intervals (Table 5 and 6). When the SRR for NHS Northwest is plotted alongside the national trend, once more a similar pattern for both can be seen throughout the period of analysis (Figure 5)



## DISCUSSION

For the first time, we present quantitative data which demonstrates that implementation of the EWTD in NHS North West in August 2008 had no significant impact on key outcomes associated with patient safety and quality of care. HSMR and standardized readmission rate (SRR) within the Northwest continued to improve at a similar rate to the England average after August 2008. The average length of stay (ALOS) analysis shows that NHS North West performed better than the national average for the majority of the study period, with no significant change in this pattern in the period following August 2008

When considering the HSMR trends in detail, three seasonal spikes in the death rate during the December to January period in each financial year analysed can be clearly seen; these occur nationally, and the pattern in NHS Northwest is no different from the national trend. When the NHS Northwest HSMR across acute trusts amongst elective and non elective patients was analysed against 2005 benchmarks across the three year period, an overall improvement could be seen which matched the rate of overall HSMR

improvement for England, and where the Northwest showed signs of a decline in improvement this is reflected in the national picture. There was no significant variation from the national HSMR trend immediately following EWTD implementation in the Northwest, or during the whole period of EWTD implementation from August 2008 until March 2009. Moreover, where NHS Northwest showed signs of a decline in improvement in the HSMR trend, this is reflected in the national picture demonstrating that this decline in improvement cannot be attributed to a localized issue.

The increase in HSMR in the North West in the winter of 2008/2009 should be examined. There is however clear evidence to demonstrate that this increase in HSMR was reflected in the national trend, and this can be attributed to the severe winter pressures related to seasonal infection, exacerbation of chronic disease and hospitalization amongst the growing elderly population [19]

Although HSMR figures are clearly a headline statistic when considering the impact of EWTD implementation in NHS Northwest, data concerning the average length of stay (ALOS) can provide valuable insights when considering the effectiveness of hospital institutions and clinical teams in satisfactorily and efficiently processing patients. Our data reveal a lower ALOS for both elective and non-elective patients at NHS Northwest in comparison to England throughout the period studied. Where there is a significant increase in the ALOS for England, this is mirrored at NHS Northwest. There is an uncharacteristic spike in the elective ALOS at the national level in December 2006 but there is also an increase, although much less significant, at NHS Northwest in the same month. In the period following August 2008 the ALOS for NHS Northwest continues to follow the national trend, although remains lower than the national average. Therefore it is clear that ALOS has not been impacted in any way that can be attributed to EWTD implementation.

Another useful marker to consider alongside the ALOS when assessing the effective provision of care is the standardized readmission rate (SRR). The SRR can provide telling data regarding the effectiveness of initial treatments, and highlight those instances in which readmission have been required. When the emergency SRR at NHS Northwest is compared to that of England for the period April 2006 to March 2009 it can be seen that NHS Northwest plots a similar pattern to that of the national average. A significant

divergence occurs in summer 2007, at which time the SRR in NHS Northwest rises above the national average. The reason for this is unclear. Similarly, there is a huge drop in the SRR in March 2008 across England and NHS Northwest; again, the reason for this is unclear and may be due to a data anomaly, but further investigation of this is beyond the scope of our report. However, it can be stated that the introduction of a 48 hour week in NHS Northwest in August 2008 did not lead to any appreciable trend change in SRR or any significant divergence from the national average.

Much of the credibility of this study rests on the robustness of the HSMR as a measure of patient safety. Since the technique was devised by Jarman [21] in the UK in the 1990's, HSMRs have been utilized worldwide to focus the discussion of patient safety and quality improvement, to monitor the provision of care over time and to identify opportunities for improvement. It has become an internationally recognised objective measure of quality of care and, in the author's opinion it is simply the best tool we currently have with which to quantify and monitor the difficult and multifactorial variables that comprise patient safety and quality of care [22]. Indeed, the Canadian Institute for Health Information adopted HSMR analysis as recently as 2005 in order to drive their patient safety and improvement agenda [23]. Certainly, the HSMR has its detractors and indeed, many researchers do not consider the HSMR to be a suitable measure of, or surrogate marker for, patient safety [20]. The pitfalls of HSMR analysis include the possibility for administrative errors such as miscoding, and the possibility of missing data. However, missing data or miscoding would be unlikely to lead to the clear and consistent results that we have demonstrated.

## **CONCLUSIONS**

The implications of these findings are widespread; we can categorically state for the first time that EWTD implementation in the North West region of England has had no detrimental effect on parameters of patient safety when considering HSMR, SRR and ALOS across acute trusts amongst elective and non elective patients. In fact there has been continued improvement in these parameters and where trends are at odds with expected results, this is mirrored nationally. No localized variance from national trends could be identified at any stage.

Patient safety is at the heart of the EWTD, and these reassuring results provide a firm basis to support a model which sees well rested, well supported doctors deployed efficiently and intelligently within a 48 hour week. However, continued efforts will need to be focused on the challenge posed nationally by the restricted working hours schedule; we must endeavor to sustain excellence in postgraduate medical training, and prioritise the continual improvement in quality of patient care within the limits of the WTR's 48 hour week.

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Contributions: JC and DK had the original idea for the study. JC wrote the first draft of the paper and wrote subsequent drafts after feedback from the other three authors. All four authors gave final approval.

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