Written Evidence from Cass Business School, City University London

Purpose:

1. To provide additional evidence to the above NAO report (specific paragraphs will be signposted) with particular reference to junior doctors and their deployment at regional and “shop-floor” levels.

2. To highlight the risks of the current imposed junior doctor contract (financial, operational and safety) with regard to its implementation and potential impact on NHS services, particularly those currently at critical medical staffing levels such as Paediatric services.

Context:

3. This paper has been developed by Professor Celia Glass, with 30 years research expertise in Combinatorial Optimisation and its applied application; Dr Roger Knight, with 25 years' experience in workforce management and Ph.D. in ergonomic design of rosters; Dr Azra Zyada, Research and Development Fellow and anaesthetic doctor with experience in medical workforce deployment. All are engaged at Cass Business School, City University London. The team has developed new approaches to rostering for the healthcare workforce.

4. We are undergoing a pilot implementation of a novel ergonomic roster, based on our research and experience, for junior doctors in an NHS Emergency Department from which we will use preliminary findings to support our evidence (Appendix 1).

Evidence and Risks:

5. NAO Paragraph 16: Inaccurate central workforce planning without coherent feedback mechanism from employers, has a direct impact on immediate and future local medical workforce numbers

   a. Employers/ services which struggle with understaffing, such as Paediatric services\(^1\), often have to hire SAS doctors, with various levels of success, to ensure that they have a permanent base of doctors that will cover clinical need, without the variability of rotating junior doctors on National Training Number (NTN) pathways.

   b. In the example of paediatric departments, staff often has to compensate for shortage of clinical staff by “stepping-up” or “stepping-down” in their roles, which is not only inefficient but risks patient safety (Appendix 2).

   c. Staff in such departments are also affected by efficiency cuts to administrative support which they must then absorb into their increasing workload, resulting in the increased workload of one junior doctor being significant\(^2\).

   d. A pernicious circle of understaffing has already been established in the NHS (Appendix 3): Inefficient planning and rostering exacerbate the problem of gaps in the rota being highlighted only at short notice. Most of gaps, are covered by NHS own staff, frequently out of professional obligation. Yet the additional workload on doctors is often unaccounted and unrecognised. In addition, training is being overwritten by service requirements, resulting in delayed career progression especially for doctors on reduced hour contracts. The effect is felt most acutely in specialisms with a high proportion of women and those which are already under pressure\(^3\). 
e. Risk: Future medical staffing maybe short for some specialities and departments due to the lack of a feedback mechanism from local to central levels.

f. Risks: Lack of understanding and visibility of staff workloads can lead to overworked staff, resulting in attrition, and therefore feeding a damaging cycle.

g. Question: What mechanisms of assurance will HEE provide employers to ensure that the supply of medical staff, particularly junior doctors, they receive will enable them to support effective service provision?

6. NAO paragraph 17: The combined impact of Modernising Medical Careers (MMC) and European Working Time Regulations (EWTR) is yet to be understood but there is evidence that MMC is a contributing factor to junior doctor shortage³
   a. There exists two main pathways for career progression for junior doctors following Modernising Medical Careers: doctors with National Training Numbers (NTN) are part-funded by Health Education England (HEE) and those doctors who are fully salaried by employing NHS trusts (called SAS doctors).
   b. NTNs are predicated on inaccurate models from Centre for Workforce Intelligence, which did not include junior doctors, which can be attributed to a resulting variability in medical staffing levels across specialities and regions.
   c. Employers are financially and operationally penalised if they do not provide training for junior doctors with NTNs, on whom they are increasingly reliant. This influences the prioritisation of scarce training time in favour of doctors with NTN than SAS doctors. In addition experience in SAS posts is not always recognised by some speciality recruiting bodies.
   d. As a result, junior doctors are dis-incentivised to progress their career to specialisation via the SAS route. Many doctors may take additional years without seniority progression, despite acquiring the relevant clinical skills, with repeat applications to NTN specialty training.
   e. There are no unbiased mechanisms of feedback to HEE that demonstrate training time is explicitly incorporated and adhered to in the junior doctors’ rota, as per the new conditions of the junior doctor contract.
   f. Risk: The career progression to specialisation of junior doctors will be delayed by dis-incentives to non-NTN paths, which will have an impact on junior doctor fill-rates
   g. Risk: Employers are increasingly dependent on junior doctors with NTNs to ensure clinical services are covered, the financial incentives and dis-incentives can risk employers’ behaviours towards junior doctors who could be disadvantaged through lack of training and/or excessive workloads
   h. Question: How will the present organisations support employers to ensure that no junior doctor is disadvantaged with regards to training or have an excessive workload?

7. NAO paragraph 1.9: Efficiency of staff deployment and the shortcomings of rotas.
   a. The purpose of a rota is to organise the workload over the week with a fair distribution of workload to each member of staff. However, by ignoring annual and study leave and making no allowance for sick leave, the implementation of rotas produces uneven coverage, undermining the very aim of the service to be driven by patient demand.
b. No explicit evaluation of staffing requirements to meet local patient demand over the day and the week appears to have been done, nor matching of duty patterns, as would be common practice in other sectors.

c. The impact of rotas on junior doctors on 17 week placements can be explicitly unfair and leaves the employer at risk of legal challenge from breaching working-hours regulations. Moreover, in order to get the required dates for annual leave doctors are expected to make duty swaps.

d. Doctors generally work beyond the end of their shift time\(^4\), frequently making the rota de facto in breach of European Working Time Regulations with serious impact on doctors’ well-being. Yet again, there are no unbiased, automated methods of reporting actual working time.

e. The rotas are written by hand, often by doctors themselves. They are very complex to construct as multiple variables need to be considered and so rarely updated. The existing quality of the rotas are as good as the doctors can currently make them. If they were able to create and accommodate higher quality rotas they would have done so already.

f. **Risk:** According to our research, it is not feasible to deliver the new contract as current rotas cannot be upgraded to the promised higher quality.

g. **Risk:** Patient demand will not be well served unless evidence-based approach is taken and duty patterns revised accordingly.

h. **Risk:** Execution of the new junior doctor contracts by a rota system, especially as exists currently, will: risk high fatigue and hence reduced health and well-being amongst doctors; nor will it likely improve retention or training (Appendix 3).

8. **NAO paragraph 19:** Capping locum and agency spend can de-stabilise services that have chronic issues with under-establishment.

a. This may be the case for departments or specialities that have a shortage of junior doctors such as Paediatrics\(^2\) (Appendix 2).

b. Such departments rely heavily on temporary staff to compensate for under-establishment and existing staff have high workloads\(^3\)

c. **Risk:** Should the locum and agency cap be enforced in April 2016, the Department of Health needs to be aware that such clinical services will be severely compromised risking patient safety, which could also be a contributing factor to further attrition(Appendix 3).

d. **Risk and Recommendation:** More generally, NHS service delivery could be undermined by a lack of qualified staff from even a small increase in attrition, as it will have a knock-on effect. This effect should be modelled, monitored and action taken to improve morale and staffing levels.

9. **NAO Recommendation c:** Implementation of junior doctor contract changes without testing feasibility can have a negative impact on clinical service provision, patient safety and financial cost.

a. The new junior doctor contract has implications for staffing levels and these will differ between specialities. The extent of the impact must be evaluated.
b. The new contract rules relating to rostering of junior doctors are insufficient to ensure doctors’ well-being and patient safety. It is well established⁵,⁶ that the fatigue impact of rosters greatly depends upon the way in which the work is distributed over a given period and not only on the total amount of work.

c. Due to the ambiguity of the contract rules, it must be noted that the proportion of night work and weekends may increase in comparison to current working patterns; reclassifying definitions of anti-social time and night duties may inadvertently encourage this and will not negate their physiological or psychosocial effects.

d. We are currently conducting a pilot study with an Emergency Department in London which is able to execute the new contract parameters for their junior doctors by using our optimised ergonomic rostering software. Each doctor has been granted their annual leave preferences and study leave days are controlled to ensure that the department will be able to accommodate them at minimum costs. However, despite the new working parameters and considered implementation, Fatigue Indices remain high because there are simply not enough doctors to enable this (Appendix 1).

e. Further expertise may be required by NHS Employers following consideration of the exemplar rotas on their website⁷ which do not comply with their new contract⁸ and are substandard in many respects; All of the following we have shown to be unnecessary; working 3 weekends in a row, 14 working days in a row and isolated night duties.

f. **Risk:** A significant increase in the number of junior doctors may be required to meet the quality parameters of a rota as set out in the new junior doctor contract AND to ensure that service coverage is maintained. This means that the contract is unlikely to be executable without additional investment, hence going outside the neutral cost envelope.

g. **Risk:** The ambiguities of NHS Employers’ new contract, especially regarding the reclassification of social time and night duties, poses a genuine risk that implementation by employers will result in increased disruption of junior doctors’ circadian rhythm and increase their social isolation. This will, in turn, impact on their health, well-being and may breach employer duty of care.

h. **Risk:** Safety levels are not properly monitored for lack of benchmark Key Performance Indicators, namely fatigue, personal preference and risk indicators.

i. **Risk:** Fatigue of doctors and risk to patients are not mitigated by the new contract as demonstrated in Appendix 1, which will negate any intention to increase quality of care and patient safety. See also Appendix 4 for an illustration of the links between staff fatigue, productivity and patient safety.

j. **Risk:** We do not believe it is mathematically feasible to implement all the agreed parameters of the new contract within the rota system.

k. **Risk:** Actual rosters as worked may continue to be excessive, leading to ill health and attrition amongst doctors as well as a reduction in patient safety, unless carefully monitored, managed and controlled.

l. **Risk:** The cost to the NHS of penalty payments associated with the new contract could be higher than anticipated, and needs to be evaluated carefully in practice in different circumstances and with consideration of the quality of the rostering tool.

m. **Risk:** The cost of collecting data on actual as well as rostered work and training for the independent guardian could be very high, unless a proper computerised planning tool is put in place to capture the necessary information.
Recommendations:

a. The Department of Health can ensure rigorous control and high standards on safety by regulating medical and appropriate healthcare activities by Health and Safety Executive as is done in similar healthcare systems such as in Australia.  

b. A study by the Health and Safety Laboratory for doctors and any health professional with “safety critical” activities similar to that carried out for the Office of Rail Regulations should be conducted.

c. A rigorous feasibility study, including modelling, of the new junior doctor contracts prior to implementation to ensure that financial, operational and safety risks are mitigated as well as providing information to central bodies on the “bottom-up” workforce deployment needs.

d. Ensure that investment is made in a high quality rostering system which supports service delivery, training and guardian functions. An improved, evidence-based, methodology for determining the demand component and optimal duty patterns is also developed. Many efficiency gains can be accomplished, if done well, including addressing NHS priorities of flexible working, meeting training requirements, predicting staff shortages and improved patient care coverage and doctors’ well-being.
This is a typical roster as worked in an Emergency Department that complies with the new junior doctor contract parameters.

It clearly demonstrates high **Fatigue Indices which are on par with current contract working conditions**.

Fatigue and Risk Indices can be reduced by:

- increasing the number of doctors; and
- reducing shift length, as well as
- adopting ergonomic rostering

As can be seen, junior doctors are working consistently above both Fatigue Index Threshold as defined by Health and Safety Laboratory\(^9\).

The Fatigue Index represents the likelihood of micro sleep according to the highest limits of the Karolinska Sleepiness Score (KSS) of 8 or 9, which equals extremely sleepy or fighting sleep. Therefore a score of 35 on the Fatigue Index means that there is a 35% chance of micro sleep (KSS = 8-9).

In comparison to similar healthcare systems such as in Australia, the UK does not currently use HSE safety parameters, such as the Fatigue and Risk Indices, for healthcare professionals. The Australian healthcare system enforces HSE regulations to the working patterns of their medical staff when engaging in healthcare activities\(^9\).
APPENDIX 2: Paediatric Services Case Study

This is a case of a large urban UK teaching hospital that provides specialised children’s services. Like many paediatric departments across the country, they struggle to find staffing coverage. According to the Royal College of Paediatrics and Child Health (RCPCH) 2014/15 survey into rota compliance and vacancies: over 77% of paediatric departments stated that they were “very concerned” or “moderately concerned” about the service not coping in the next 6 months.

This hospital spends a substantial amount on nursing and doctor agency and locum staff. Like many other paediatric services across the country there are barriers to getting locum cover as highlighted below. It is not uncommon for consultants to ‘step-down’ to compensate for the lack of registrar/junior doctor cover, resulting in a potentially avoidable cost.

Issues with temporary, ad hoc staffing cover in Paediatrics include:

- Getting a locum is difficult as there are few available with such specialist skills and of the high quality demanded by the department.
- Permanent locums are preferable to departments due to their familiarity.
- Difficult environment for a locum to enter: quite often there is no formal induction given to a locum doctor on arrival to a shift. Staff admit that specialist environments like paediatrics can sometimes be unwelcoming and suspicious towards locums as, according to one paediatric doctor, “90% is operational familiarity and local protocols are variable between departments, which can be confusing for new locums or more junior locum doctors”.
- A lack of adequate levels of junior doctors in paediatric departments. A national average of 20% rota gaps² in paediatric departments, means that existing junior doctors are unable to do any mandatory supporting work such as clinical audits, training and quality improvement.
- One junior doctor can be covering the workflows of the paediatric emergency department, neonatal unit, paediatric admissions unit, ward referrals and assisting on paediatric intensive care. The workload is high and is physically and mentally intense with often no time or leeway for breaks.
- Rotas have no contingency for short-term staffing needs, such as sickness and short-term absence and existing doctors are mandated to cover the workload if it is within 48 hours’ notice.
- Lack of planning for those on maternity leave often finds senior doctors absorbing their juniors’ workload or, worse still, with junior doctors stepping-up to senior roles.
- Paediatrics is a high-workload and high-risk environment and not ideal for locums, hence the fail-safe for staffing cover is to have the more senior doctor cover the gaps for juniors and this can often be a consultant.
APPENDIX 3: Patient Safety, Workforce and Workload (incl. productivity) are interlinked

The Key Performance Indicators (KPIs) for each area are interlinked. A compromise in one area can lead to or be the cause of compromise in the other two.


APPENDIX 4: A case of patient harm; the intrinsic links between staff fatigue, productivity and patient safety

The following case study of work in an operating theatre in Trust “X” serves to illustrate the effect of poor planning and monitoring as it affects shift workers and patient safety:

- The anaesthetist, a locum staff member, had an accumulation of 3-session days (days that are 12 hours+), the surgeon was also in a similar situation. Pressure of work due to productivity targets meant that the theatre list was on the upper limit of staff’s productive capacity and they were already over-running at midpoint during the day.  
- The anaesthetist administered a drug through the wrong route and the patient had a cardiac arrest. The patient was resuscitated successfully by the team.  
- The “root cause analysis” found the cause to be “human error due to fatigue”  
- Three session-days had long been a complaint by the surgeons at this hospital due to the fatigue element  
- The graph below demonstrated that 3-session (Full Day) days became less productive throughout the day (which was corroborated by an ethnographic study), but incurred higher financial cost to the hospital and a personal cost to staff.  

Histogram: Procedures undertaken by hour of the day in Surgical Operating Theatres of Trust “X” on a Full day otherwise known as a 3-session day

- Theatre staff attributed the loss of productivity throughout the day to fatigue and noted that the graph only showed operating time and did not include the wrap-around work associated which can be 3+ hours to their working day not including commuting time.  
- Recruitment and retention of theatre nurses was a severe problem at this NHS Trust.

Although this work requires further research, the messages from staff support the message of Appendix 3. Patient safety can be put at risk when Key Performance Indicators are unsupported by targeted investment; the importance of taking into account staff experience and making improvements accordingly is critical in this.

*18 February 2016*
 References for main body of report:

1. RCPCH. Medical Workforce Census. 2013


3. Royal College of Paediatrics and Child Health. Modernising Medical Careers Cohort study.

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5. Health and Safety Executive. The development of a fatigue/ risk index for shiftworkers. 2006. RR46.p7
   http://www.hse.gov.uk/research/rrhtm/rr446.htm

   http://www.nhsemployers.org/your-workforce/need-to-know/junior-doctors-contract/pay-calculator/rotas

7. NHS Employers sample rotas (accessed 19/02/2016)
   http://www.nhsemployers.org/~/media/Employers/Documents/Need%20to%20know/1516%20PO07314%20%20Summary%20JD%20OFFER%20%20Final%20version%20180216.pdf

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