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## **Pandemic could overwhelm critical care beds in England, especially children's units**

Experts in intensive care and anaesthesia have predicted that the current swine flu pandemic could overwhelm critical care beds and ventilators in England, with hospitals on the South East Coast, and in the South West, East of England and East Midlands, being worst hit.

The research, fast-tracked for online publication by *Anaesthesia*, suggests that demand for critical care beds could outstrip supply by up to 130 per cent, with up to 20 per cent excess demand for ventilators in some regions.

"Any predictions need to be based on the most accurate information available at the time and we recognise that we are in the early stages of the pandemic" says Dr Ari Ercole, a member of the research group led by Professor David Menon from the University of Cambridge.

"However, based on figures provided by the ten regional health authorities and using the FLUSURGE model developed by the Centres for Disease Control and Prevention in the USA, we can see that hospitals would face massive excess demand even if the pandemic lasted an optimistic twelve weeks.

"Paediatric intensive care facilities for children under 15 would be quickly exhausted, as they make up 10 per cent of current provision but could face 30 per cent of the demand for pandemic related beds.

"Early experience of the present strain suggests that the attack rate is particularly high in the young and that this virus may severely compromise the immune systems of people who contract it."

The research group, which also involved Dr Bruce Taylor from the Intensive Care Society and Dr Andrew Rhodes from St George's Hospital, London, has calculated that there is an average of 4.5 critical care beds for each of the 100,000 people living in England. These vary from 3.0 on the South East Coast to 7.5 in London.

Based on nearly 62,000 people being affected by swine flu at any one time, they predict that:

- Demand for critical care beds would outstrip supply by an overall average of 60 per cent at the pandemic's peak. The model suggests that only London would be able to operate at just under maximum capacity (94%). However, the high population density in the Capital could increase the percentage who contract the infection, leading to higher demand than in other parts of the country.
- In the nine other English health regions, demand would outstrip supply by at least 20%. The largest shortfalls would be on the South East Coast (130% above capacity) and in the East of England, East Midlands and South West (120% above).
- Average demand for ventilators would be 78 per cent of capacity at the pandemic's peak, with six regions predicted to cope with demand.
- However the East of England, East Midlands and South West would face a shortfall of 10% and the South East Coast would face a shortfall of 20%.

The bed figures and predictions for each region are as follows:

- Total critical care beds per 100,000 population: average 4.5, London 7.5, North East 5.9, North West 5.0, Yorkshire and Humberside 4.4, South Central 4.2, West Midlands 4.2, East of England 3.2, East Midlands 3.2, South West 3.1, South East Coast 3.0.
- Predicted peak critical care bed occupancy as a percentage of total capacity: average 160%, London 94%, North East 120%, North West 140%, Yorkshire and Humberside 160%, South Central 160%, West Midlands 170%, East of England 220%, East Midlands 220%, South West 220%, South East Coast 230%.
- Predicted peak ventilator utilisation as a percentage of total capacity: average 78%, London 47%, North East 59%, North West 69%, Yorkshire and Humberside 80%, South Central 82%, West Midlands 84%, East of England 110%, East Midlands 110%, South West 110%, South East Coast 120%.

Latest official figures show there are 2,030 level three critical care adult beds in England and 265 paediatric intensive care beds, together with 1,607 adult and 43 paediatric high dependency beds that could potentially be used to ventilate people. The authors have assumed that the number of ventilators available equals the number of critical care beds.

"One of the main problems is that these beds already run at high occupancy rates and even delaying elective surgery to create additional ventilated beds would not meet demand" explains Dr Ercole.

Dr Jonathan Handy, a consultant intensivist and anaesthetist from the Chelsea and Westminster Hospital, London, says that the results of the study are alarming. "The best case estimates predict that capacity could be significantly increased from baseline, while the worst case could exceed current capacity by an order of magnitude" he says in an accompanying editorial.

"All acute trusts should have already developed local flu plans to include a 100% increase in critical care capacity. However, some may be more comprehensive (and optimistic) than others."

He adds that the predicted demand levels suggest that immediate action is needed to ensure that practical measures are in place, from stockpiling supplies to looking at how medical students could play an active role in patient care.

Dr Handy argues that if the worst-case scenario fails to emerge the work carried out to expand critical care capacity will never be wasted, in a world where terrorism and environmental and man-made disasters are omnipresent.

"One thing that can be certain, however, is the emergency planning mantra" he says. "To fail to plan is to plan to fail."

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#### **Note to editors**

Modelling the impact of an influenza A/H1N1 pandemic on critical care demand from early pathogenicity data: the case for sentinel reporting. Ercole A, Taylor B L, Rhodes A and Menon D K. *Anaesthesia*. Published online early ahead of print. July 2009.

Critical care bed capacity during the flu pandemic: implications for anaesthetic and critical care departments. Handy J M. *Anaesthesia*. Published online early ahead of print. July 2009.

*Anaesthesia* is the official journal of the Association of Anaesthetists of Great Britain and Ireland and is international in scope and comprehensive in coverage. It publishes original,

peer-reviewed articles on all aspects of general and regional anaesthesia, intensive care and pain therapy, including research on equipment.

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