

have to be someone who is qualified and trained to make that judgment. Those supervising foundation year doctors need ongoing training in assessment and appraisal of clinical and non-clinical competencies.

Any assessment will have a failure rate and also an appeals process, so departments will want to know that their own systems are robust even when following the contents of the national curriculum for foundation programmes.

Medical schools should innovate in preparing for the foundation years. Increasingly, students are sitting final examinations up to six months before they qualify. This offers an ideal opportunity to develop the foundation competencies, especially those of working with non-medical colleagues.⁸ By harmonising the learning objectives and competency frameworks in this period of advanced clinical practice medical schools can facilitate a focused start to the foundation programme.

Overemphasis on asking foundation programme doctors to develop specialist skills may well cause the programme to backfire. Despite pressure to train doctors for more complex tasks in shorter times, we should not target any individual doctor's foundation programme at only one career path. To do so could erode the real strength of the foundation programme, which is to ensure that all doctors have attained a broad competency level in patient care and that those competencies can be demonstrated. The foundation year 2 ethos is to give doctors greater exposure to more specialties, as previous studies have shown that a substantial number of doctors change their career preference during the senior house officer period.⁹⁻¹⁰ Broad based programmes of the foundation years are intended to "support movement of doctors into and out of training and between training programmes."¹¹ Any progression along the path of specialist training should be seen as an opportunity, not a requirement. The postgraduate medical education and training board (PMETB) has ruled out prospective approval for specialist training in foundation year 2 but indicated that individuals may apply retrospectively to accredit time spent in foundation year 2 in their specialty.

High quality career advice should be delivered as a service that starts at medical school and extends throughout training. We risk high attrition rates if students and junior doctors continue to lack a robust career guidance package. Doctors will have to apply for

"run through" specialist training mid way through foundation year 2, when they may still lack postgraduate exposure to the very specialty they are considering.

The foundation programme will cause logistic problems as we strive to reform the senior house officer grade from its rudderless, open ended, service driven, current status to a focused educational experience. The current pilot programmes will reveal something about how foundation programmes meet the original intention of providing "individually tailored programmes to meet specific needs," and their evaluation must be widely disseminated.¹⁰

Challenging though it is, the foundation programme offers an opportunity to reshape the delivery of health care. Doctors in training need to be convinced of the benefits of the new scheme, and all those who will deliver this new agenda must be trained to do so. Short term costs must be borne if we are to achieve the longer term vision of quality assuring the holistic competence of the future medical workforce.

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- 1 Department of Health. *Modernising medical careers; the response of the four UK health ministers to the consultation on unfinished business: proposals for reform of the senior house officer grade*. London: DoH, 2003.
- 2 Dillner L. Senior house officers: the lost tribes. *BMJ* 1993;307:1549-51.
- 3 Junior Doctors Committee. *The future of the SHO grade*. London: British Medical Association, 1998.
- 4 Department of Health. *The next steps—the future shape of foundation, specialist and general practice training programmes*. London: DoH, 2004.
- 5 *Liberating learning: The report of the conference of postgraduate medical deans' ad hoc working group on the educational implications of the European Union working time directive*. London: COPMED, 2002. www.copmed.org.uk/Publications/LiberatingLearning/index.html (accessed 8 June 2004).
- 6 Aargaard E, Teherani A, Irby D. Effectiveness of the one-minute preceptor model for diagnosing the patient and the learner: proof of concept. *Acad Med* 2004;79:42-9.
- 7 General Medical Council. *Good medical practice*. London: GMC, 2001.
- 8 Department of Health. *A health service of all the talents. Developing the NHS workforce*. London: DoH, 2000.
- 9 British Medical Association. *Career intentions of first year senior house officers: cohort study of 1995 medical graduates: third report*. London: BMA, 1998.
- 10 British Medical Association. *Cohort study of 1995 medical graduates: sixth report*. London: BMA, 2001.
- 11 Department of Health. *Unfinished business. Proposals for the reform of the senior house officer grade*. London: DoH, 2002.

Tackling the next influenza pandemic

"Ring" prophylaxis of close contacts with antivirals may be an effective strategy

Recent efforts have been directed towards preparing rapid effective responses to epidemics of smallpox and severe acute respiratory syndrome (SARS). We must now hasten the preparations for another inevitable threat—the next global influenza pandemic. Currently contingency plans are largely based on rapid vaccination of susceptible populations; other measures, such as treatment with antiviral drugs, serve only as adjuncts.¹ In practice, however, technical constraints on vaccine production—foremost among these the time required to initiate mass vaccine produc-

tion during a pandemic—will limit the effectiveness of this measure in the first stages of the pandemic.² Recently a systematic review by Cooper et al addressed the effectiveness of neuraminidase inhibitors in the treatment and prevention of influenza.³ The authors concluded that the prophylactic use of these drugs can lead to a reduction of 70-90% in the risk of laboratory confirmed symptomatic flu, depending on the strategy adopted and the population studied. Neuraminidase inhibitors have also shown efficacy in preventing transmission of influenza in institutions and community

settings.^{3,4} The availability of a highly effective supplement to vaccination opens to debate the appropriate role of neuraminidase inhibitors and other antiviral drugs in the control of pandemic influenza.

Some authors argue that mass use of prophylactic antiviral drugs to suppress a pandemic is not feasible.⁵ When considering large scale, long term, continuous prophylactic treatment, some challenges may indeed prove too difficult to overcome. Inadequate compliance with prolonged daily treatment may decrease its effectiveness and may lead to the emergence of resistant viral strains. Insufficient supplies and limited manufacturing ability present further difficulties. Currently in the United States, for example, only several million persons could receive continuous antiviral chemoprophylaxis each month during a pandemic.⁶ Stockpiling of antiviral drugs is therefore necessary, but the cost of stockpiling in such magnitude looks to be prohibitively expensive. These limitations necessitate a search for novel strategies to effectively employ antivirals on a smaller scale, as was stressed by the World Health Organization in its global agenda on influenza surveillance and control and by the US Centers for Disease Control and Prevention in its pandemic contingency plan.^{6,7}

We suggest an alternative strategy, borrowed from the lexicon of smallpox containment, where it is known as ring vaccination. This strategy, routinely used in the past to quell smallpox outbreaks, entailed post-exposure vaccination of the close contacts of a case. For smallpox, this approach provided a wide safety net of prevention, while focusing vaccination where it was needed most. This approach may be applicable to the initial management of an influenza pandemic: in the absence of a strain specific vaccine during the first stages of the outbreak, treatment of influenza cases and their contacts may decrease attack rates substantially while rationing the pharmacological treatment to where it is needed most.

Influenza possesses epidemiological characteristics markedly different from those of smallpox, such as a shorter incubation period, a higher attack rate, and a lack of disease specific symptoms. Together, these characteristics may impose difficulties in accurately identifying and rapidly treating contacts. Still this policy in conjunction with a strict regimen of isolation and quarantine can be expected to slow down dissemination of the disease, providing valuable time for production and distribution of a vaccine. This goal may thus be achieved in a more frugal manner in terms of costs and logistics than was previously described. Antiviral ring prophylaxis, which proved to be effective in family settings, requires only short term daily treatment for a period of 5-10 days,^{8,9} and targets a relatively limited proportion of the population, thus substantially reducing the amount of drug to be stockpiled and dispensed rapidly. Furthermore, contacts receiving antiviral prophylaxis may form protective antibodies due to subclinical infection, rendering them immune for the duration of the pandemic.¹⁰ Finally, a short treatment period will probably help to increase compliance and to reduce the risk of emerging drug resistance.

Cost seems to be the limiting factor in any strategy employing widespread use of neuraminidase inhibitors or other antiviral drugs in the context of an influenza pandemic. However, the projected costs of a major influenza pandemic are estimated to be high in terms

of morbidity, mortality, and spending on hospitalisation. The economic impact of such an event in the United States is estimated to be over \$100bn (£56bn; €80bn).¹¹ This cost may be decreased, however, through the use of an appropriate containment strategy during the first stages of the pandemic, which would make this expenditure a worthwhile investment.²

Although this strategy seems to be worthy of investigation, several issues must be addressed before it is adopted in practice. Not enough is known about the extent of transmission through subclinical infections during pandemics, and the effect of such transmission on the overall effectiveness of the proposed strategy is difficult to estimate. Furthermore, chemoprophylaxis would require large proportions of the healthy asymptomatic population to comply with daily treatment, but compliance in such extreme circumstances is difficult to predict. Finally, chemoprophylaxis will not suffice as a sole preventive measure in the case of a pandemic but rather must be supported by additional measures such as quarantine, isolation, and prevention of mass congregations. Public acceptance of such measures is unknown but is probably culture dependent and was proved surprisingly feasible during the recent SARS epidemic.

Some theoretical aspects of the suggested strategy may be established by using appropriate mathematical modelling or by testing this strategy during local epidemics. The work on such models is already under way, and the outcomes of these models may serve to strengthen the hypothesis we raise here. We believe that the use of this relatively frugal strategy of epidemiologically directed chemoprophylaxis will prove both effective and cost beneficial in the defence against an emerging threat to global public health.

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- 1 Stöhr K. Preventing and treating influenza. *BMJ* 2003;326:1223-4.
- 2 Laver G, Garman E. The origin and control of pandemic influenza. *Science* 2001;293:1776-7.
- 3 Cooper NJ, Sutton AJ, Abrams KR, Wailoo A, Turner DA, Nicholson KG. Effectiveness of neuraminidase inhibitors in treatment and prevention of influenza A and B: systematic review and meta-analyses of randomised controlled trials. *BMJ* 2003;326:1235-40.
- 4 Couch RB. Prevention and treatment of influenza. *N Engl J Med* 2000;343:1778-87.
- 5 van Genugten ML, Heijnen ML, Jager JC. Pandemic influenza and healthcare demand in the Netherlands: scenario analysis. *Emerg Infect Dis* 2003;9:531-8.
- 6 Centers for Disease Control and Prevention. *Pandemic influenza: a planning guide for state and local officials (draft 2.1)*. Atlanta: National Vaccine Program Office, CDC. www.cdc.gov/odnvp/pubs/pandemicflu.htm (accessed 5 Jan 2004).
- 7 Stöhr K. The global agenda on influenza surveillance and control. *Vaccine* 2003;21:1744-8.
- 8 Welliver R, Monto AS, Carewicz O, Schatteman E, Hassman M, Hedrick J, et al. Effectiveness of oseltamivir in preventing influenza in household contacts: a randomised controlled trial. *JAMA* 2001;285:748-54.
- 9 Hayden FG, Gubareva LV, Monto AS, Klein TC, Elliott MJ, Hammond JM, et al. Inhaled zanamivir for the prevention of influenza in families. *N Engl J Med* 2000;343:1282-9.
- 10 Whitley RJ, Hayden FG, Reisinger KS, Young N, Dutkowski R, Ipe D, et al. Oral oseltamivir treatment of influenza in children. *Pediatr Infect Dis J* 2001;20:127-33.
- 11 Meltzer MI, Cox NJ, Fukuda K. The economic impact of pandemic influenza in the United States: priorities for intervention. *Emerg Infect Dis* 1999;5:659-71.