Low detection rates imply longer duration of infections, which imply increased risk of HIV transmission. In an unpublished study, 70 randomly selected, HIV positive patients attending our centres were estimated to have been infected for a mean of 8.5 years. In that study, for only 56% had doctors broached HIV testing, only 6% of patients had ever declined HIV testing, and 46% of those who were HIV positive reported that their explicit consent to testing should not have been needed. Such results need to be replicated, but implications are clear.

Lowering the threshold for HIV testing will lead to early diagnosis and treatment of infected individuals, which may prevent the development of AIDS and the transmission of infection.^{10 11}

What is the role of voluntary counselling and testing? Voluntary counselling and testing has been accepted practice for more than 10 years. Uptake of voluntary counselling and testing, however, has been poor, even in those with high risk sexual activities.² Sizeable proportions of infected people never attend genitourinary medicine clinics for voluntary counselling and testing even if referred. In addition, it seems that pre-test counselling is, on balance, not dramatically effective in reducing high risk sexual activity.¹²

Many HIV infected individuals receive medical attention before they are diagnosed and opportunities for testing may have been discouraged by the "need" to perform or organise voluntary counselling and testing. Such patients would include, for example, those with persisting lymphopenia, neutropenia, or thrombocytopenia. A routine approach to testing would almost certainly increase the number of early HIV diagnoses, which would then allow concentration on subsequent informed counselling and education of patients and their partners and possible reduction in spread of infection.

Highly active antiretroviral therapy has rendered HIV similar to other serious diseases. We believe that HIV testing should be widely accepted, without conventional voluntary counselling and testing, as patients at risk of cancer do not receive voluntary counselling and testing before chest x rays, or patients with chest infections do not routinely receive voluntary counselling and testing before stains for acid fast bacilli on sputum are requested.

The current combination of reluctance of busy doctors to initiate pre-test counselling and denial by patients has resulted in late diagnosis and ongoing spread of infection. We propose that if a patient freely consents to be investigated, a doctor can initiate tests aimed at excluding serious diseases without an in depth discussion of all possible results, provided that the test result, positive or negative, should benefit the patient.

Routine voluntary counselling and testing was appropriate to the 1980s. Times have changed. The benefits of early diagnosis of HIV are multiple. HIV testing should now not be accorded any special status. Doctors should now undertake the test by using the same approach as used in any other test with serious implications.

Kaveh Manavi *specialist registrar in genitourinary medicine*
(tirbad@yahoo.com)

Philip D Welsby *consultant in infectious diseases*

Department of Genitourinary Medicine, Royal Infirmary of Edinburgh, Edinburgh EH4 1EW

Competing interests: None declared.

- 1 Department of Health. Guidelines for pre-test discussion on HIV testing. www.advisorybodies.doh.gov.uk/eaga/pdfs/guidelineshivtestdiscuss.pdf (accessed 19 Nov 2004).
- 2 Health Protection Agency. *HIV and other sexually transmitted infections in the United Kingdom in 2002*. Annual report. Part one: HIV infection. London: HPA, 2003.
- 3 Health Protection Agency. The national CD4 surveillance scheme. 2002 survey results. www.hpa.org.uk/infections/topics_az/hiv_and_sti/hiv/epidemiology/cd4.htm#2001 (accessed 13 Oct 2004).
- 4 Burns F, Mercer CH, Mercey D, Sadiq ST, Curran B, Kell P. Factors that may increase HIV testing uptake in those who decline to test. *Sex Transm Infect* 2004;80:249.
- 5 Spielberg F, Branson BM, Goldbaum GM, Lockhart D, Kurth A, Celum CL, et al. Overcoming barriers to HIV testing: preferences for new strategies among clients of a needle exchange, a sexually transmitted disease clinic, and sex venues for men who have sex with men. *J Acquir Immune Defic Syndr* 2003;32:318-27.
- 6 Seigel K, Raveis VH, Gorey E. Barriers and pathways to testing among HIV infected women. *AIDS Educ Prev* 1998;10:114-27.
- 7 Kellock DJ, Rogstad KE. Attitudes to HIV testing in general practice. *Int J STD AIDS* 1998;9:263-7.
- 8 Burns F, Mercer CH, Mercey D, Sadiq ST. Barriers to HIV testing: a survey of GUM clinic attendees. *Sex Transm Infect* 2004;80:247.
- 9 British Co-operative Clinical Group. Screening for HIV infection in genito-urinary medicine clinics: a lost opportunity? *Sex Transm Infect* 2000;76:307-10.
- 10 Palella FJ Jr, Deloria-Knoll M, Chmiel JS, Moorman AC, Wood KC, Greenberg AE, et al. Survival benefits of initiating antiretroviral therapy for HIV infected persons in different CD4 cell strata. *Ann Intern Med* 2003;138:620-6.
- 11 Quinn TC, Wawer MJ, Sewankambo N, Serwadda D, Li C, Wabwire-Mangen F, et al. Viral load and heterosexual transmission of human immunodeficiency virus type-1. Rakai Project Study Group. *N Engl J Med* 2000;342:921-9.
- 12 The EXPLORE Study Team. Effects of a behavioural intervention to reduce acquisition of HIV infection among men who have sex with men: the EXPLORE randomised controlled study. *Lancet* 2004;364:41-50.

Simulation based training

Is being extended from training individuals to teams

Simulation has been used for many years to train aviation and military personnel for work in hazardous environments. Effective and safe performance in these settings requires both highly skilled individuals and a high degree of team coordination. In addition to individual competence, communication between team members and decision making become particularly important during the management of crisis scenarios. Over the past few years several articles have described the use of simulations, simple and computer based, for the acquisition of technical skills in surgery, endoscopy, and anaesthesia.¹⁻³ The focus

has largely been on the acquisition and assessment of individual technical skills, but now the role of simulations in training teams to work with a greater degree of coordination is being acknowledged.

Simulations are beginning to play an important part in the training of personnel in the operating theatre, emergency department, and the obstetric suite.^{3 w1 w2} For example, courses in anaesthesia crisis resource management address the technical skills and

References w1-w5 are on bmj.com

knowledge required to effectively manage crises, but also place considerable emphasis on judgment, decision making, vigilance, and communication with other team members.³ Our group in Imperial College has extended the use of surgical simulations beyond the acquisition and assessment of solely technical skills, to training teams in the operating theatre.⁴ Using a simple synthetic model integrated with an anaesthetic mannequin, our group has developed a simulated operating theatre for the training and assessment of surgeons.^{5,6} The simulation has been further modified to develop a crisis scenario (bleeding).^{7,8} Feedback on technical and team skills is provided by a surgeon and a psychologist. Scenarios are now being developed that draw on the skills of all members or the surgical team, with feedback to anaesthetists, nurses, and surgeons.

Considerable debate continues over the use of simulations for the assessment of professional competence. Evidence shows that recently developed methods of assessment, such as video based global rating scales and checklists, can be integrated with simulations to assess technical skills in surgery objectively.⁵ In addition, virtual reality simulators have been validated for the assessment of technical skills in surgery and endoscopy.^{6,9} Anaesthetists have assessed time taken to respond to a crisis and have developed scoring systems based on actions performed during simulations.⁷ However, the focus so far has been on the assessment of psychomotor proficiency. Gaba et al modified a rating scale developed for the assessment of non-technical or team skills in cockpit crews to anaesthesia.⁸ Fletcher et al have developed and validated a rating scale to assess the non-technical skills of anaesthetists.⁹ Our group is in the process of developing performance measures for the whole surgical team.¹⁰ At present, such ratings scales are useful for providing structured and clinically relevant feedback.¹⁰ However, measures of individual and team performance are not yet sufficiently developed or validated for routine use in summative assessments.

Simulation based training has been evaluated in aviation using questionnaire surveys and observations of cockpit crew, which show an improvement in performance after training in crisis resource management.¹¹ Simulation based training is considered to be a crucial factor in the high degrees of safety achieved in commercial aviation. In medicine, preliminary research already reflects the benefit of simulations on the psychomotor performance of surgical trainees.¹² In addition, participants undertaking simulation training believe that it enhances their performance and clinical effectiveness.³

The advantages of simulation based learning are many. The learning is interactive and occurs in realistic environments. Learners can make mistakes

and appreciate their consequences without causing harm to patients. The management of crisis events can be practised and rehearsed to enable personnel to be better prepared when such events occur in real life. Most importantly, teams can be trained to work in a coordinated and effective manner.

Looking ahead we see several challenges for simulation. Although numerous simulators are available for training technical skills in surgery and endoscopy, we need to integrate these into the training curriculum in a structured manner. In addition, we need to integrate mannequin based simulations into the nursing and medical curriculums and understand how and when it may make its most effective contribution. By a process of task analysis we need to understand much more about what makes a simulation realistic and effective. Costly and complicated mannequins and simulators may not always be necessary for effective training. We need to develop reliable and valid measures of individual and team performance to underpin both training and evaluation of training. Finally, we need better evidence of the efficacy and cost effectiveness of simulation if it is to advance beyond its current niche to occupy a central place in medical and nursing training.

K Moorthy *research fellow*

C Vincent *professor*

A Darzi *Professor*

Clinical Safety Research Unit, Department of Surgical Oncology and Technology, Imperial College, London W2 1NY
(k.moorthy@imperial.ac.uk)

Competing interests: None declared.

- Hamdorf JM, Hall JC. Acquiring surgical skills. *Br J Surg* 2000;87:28-37.
- Tuggy ML. Virtual reality flexible sigmoidoscopy simulator training: impact on resident performance. *J Am Board Fam Pract* 1998;11:426-33.
- Holzman RS, Cooper JB, Gaba DM, Philip JH, Small SD, Feinstein D. Anesthesia crisis resource management: real-life simulation training in operating room crises. *J Clin Anesth* 1995;7:675-87.
- Moorthy K, Munz Y, Adams S, Pandey Y, Darzi A. A human factors analysis of technical and team skills during procedural simulations. *Br J Surg* 2004;90(suppl 1):88-9.
- Moorthy K, Munz Y, Sarker S, Darzi A. The objective assessment of technical skills in surgery. *BMJ* 2003;327:1032.
- Gallagher AG, Satava RM. Virtual reality as a metric for the assessment of laparoscopic psychomotor skills. Learning curves and reliability measures. *Surg Endosc* 2002;16:1746-52.
- Byrne AJ, Greaves JD. Assessment instruments used during anaesthetic simulation: review of published studies. *Br J Anaesth* 2001;86:445-50.
- Gaba DM, Howard SK, Flanagan B, Smith BE, Fish KJ, Botney R. Assessment of clinical performance during simulated crises using both technical and behavioral ratings. *Anesthesiology* 1998;89:8-18.
- Fletcher G, Flin R, McGeorge P, Glavin R, Maran N, Patey R. Anaesthetists' non-technical skills (ANTS): evaluation of a behavioural marker system. *Br J Anaesth* 2003;90:580-8.
- Moorthy K, Munz Y, Forrest D, Pandey V, Undre S, Darzi A. Face validity and participants' perceptions of the value of surgical crisis management (SCM) training. *Br J Surg* 2004;91(suppl 1):79.
- Helmreich RL, Foushee HC. Why cockpit resource management? Empirical and theoretical bases of human factors in training and aviation. In: Wiener E, Kanki BG, Helmreich RL, editors. *Cockpit resource management*. San Diego, CA: Academic Press, 1993:3-45.
- Grantcharov TP, Kristiansen VB, Bendix J, Bardram L, Rosenberg J, Funch-Jensen P. Randomized clinical trial of virtual reality simulation for laparoscopic skills training. *Br J Surg* 2004;91:146-50.