

measurement of sulphide concentrations in mouth air is reproducible and sensitive and relates well to assessments of malodour assessment by observers,^{12,13} measurement with a portable sulphide monitor provides an objective assessment. Gas chromatography may provide a more accurate assessment of the wider range of compounds responsible for malodour and has been adapted for use with small samples of mouth air.⁴ The history and examination should be directed towards eliminating any dietary and systemic causes. A full assessment of oral and dental health is always indicated, and, although a dental practitioner is the best trained for this, a periodontologist has special skill in disorders affecting the gingiva and periodontium.

The most reliable management is to reduce the oral flora, particularly anaerobes; this is best achieved by improving oral hygiene by brushing the teeth, cleaning between the teeth, and other means. A simple, inexpensive, and effective treatment is to use a mouth rinse of 0.2% aqueous chlorhexidine gluconate, which is remarkably active against a range of organisms in dental plaque and can also reduce halitosis whether judged subjectively or by decreases in volatile sulphides in the mouth air.¹³ Hydrogen peroxide mouthwashes reduce concentrations of salivary thiols and may be useful in the management of acute necrotising

(ulcerative) gingivitis, but they are not indicated in most other oral infections. Antimicrobial treatment is rarely needed except in severe or recalcitrant cases, though it can be useful to reduce postoperative halitosis.¹⁴

Various other products designed to reduce halitosis are under development. For example, cetylpyridinium chloride and a two phase oil-water mouthwash containing olive and other essential oils¹⁵ seem to reduce volatile sulphur compounds in the breath.^{15,16} A range of mouth fresheners is also available. Currently, however, the cheapest and most effective management for most cases of halitosis is simple, regular oral cleaning with a toothbrush and dental floss.

CRISPIAN SCULLY
Professor

STEPHEN PORTER
Consultant senior lecturer

Department of Oral Medicine,
Eastman Dental Institute,
London WC1X 8LD

JOHN GREENMAN
Senior lecturer

Faculty of Applied Sciences,
University of West of England,
Bristol BS16 1QY

- 1 Yaegaki K, Takano Y, Suetaka T, Arai K, Masuda T, Ukisu S. Investigation of people's attitudes and reactions towards oral malodour. A preliminary survey conducted on dental hygienic students. *Shigaku* 1989;77:171-8.
- 2 Kleinberg I, Westbay G. Salivary and metabolic factors involved in oral malodour formation. *J Periodontol* 1992;63:768-75.
- 3 Yaegaki K, Suetaka T. Fractionation of the salivary cellular elements by Percoll density gradient centrifugation and the distribution of oral malodour precursors. *Shigaku* 1989;77:269-75.
- 4 Tonzetich J, Coil JM, Ng W. Gas chromatographic method for trapping and detection of volatile organic compounds from human mouth air. *Journal of Clinical Dentistry* 1991;2:79-82.
- 5 Kostel JG, Preti G, Zelson PR, Brauner L, Baehni P. Oral odours in experimental gingivitis. *J Periodont Res* 1984;19:303-12.
- 6 Yaegaki K, Sanada K. Volatile sulfur compounds in mouth air from clinically healthy subjects and patients with periodontal disease. *J Periodont Res* 1992;27:233-8.
- 7 Yaegaki K, Sanada K. Biochemical and clinical factors influencing oral malodour in periodontal patients. *J Periodontol* 1992;63:783-9.
- 8 Coli JM, Tonzetich J. Characterisation of volatile sulphur compounds production at individual gingival crevicular sites in humans. *Journal of Clinical Dentistry* 1992;3:97-103.

- 9 Moriyama T. Clinical study of the correlation between bad breath and subgingival microflora. *Shikwa Gakuho* 1989;89:1425-39.
- 10 Tiomny E, Arber N, Moshkowitz M, Peled Y, Gilat T. Halitosis and *Helicobacter pylori*. A possible link? *J Clin Gastroenterol* 1992;15:236-7.
- 11 Iwu CO, Akpata O. Delusional halitosis. Review of the literature and analysis of 32 cases. *Br Dent J* 1990;168:294-6.
- 12 Rosenberg M, Kulkarni GV, Bony A, McCulloch CA. Reproducibility and sensitivity of oral malodour measurements with a portable sulphide monitor. *J Dent Res* 1991;70:1436-40.
- 13 Rosenberg M. Halitosis - the need for further research and education. *J Dent Res* 1992;71:424.
- 14 Grandis JR, Johnson JT, Vickers RM, Yu VL, Wagener MM, Wagner RL, et al. The efficacy of perioperative antibiotic therapy on recovery following tonsillectomy in adults: randomised double-blind placebo-controlled trial. *Otolaryngol Head Neck Surg* 1992;106:137-42.
- 15 Rosenberg M, Gelernter I, Barki M, Bar-Ness R. Day-long reduction of oral malodour by a two-phase oil-water mouthrinse as compared to chlorhexidine and placebo rinses. *J Periodontol* 1992;63:39-43.
- 16 Yaegaki K, Sanada K. Effects of a two phase oil-water mouthwash on halitosis. *Clinical Preventive Dentistry* 1992;14:5-9.

Appropriateness: the next frontier

Appropriateness ratings could revolutionise health care

The health care systems of developed countries share common problems. Firstly, the explosion of costly medical technologies increasingly jeopardises our ability to give everybody all the care that would benefit them. And, secondly, the explosion in medical services has made it virtually impossible to remember the indications, complications, and costs of procedures and drugs—that is, to practise good medicine without additional help.

Studies of appropriateness underline the seriousness of these problems. By appropriate care I mean that for which the benefits exceed the risks by a wide enough margin to make it worth providing. If we could increase appropriate and decrease inappropriate care, the benefits to patients and society in terms of health and wealth would be enormous. Indeed, without methods to detect inappropriate care, society's ability to maintain universal insurance coverage may disappear.¹

But how do you measure the appropriateness of care?² Although the clinical literature is the place to start, it mostly concerns the efficacy of a procedure performed under ideal

conditions and tells us little about what happens when the procedure is done under less than ideal conditions.³ Furthermore, research rarely includes outcome measures that are relevant to patients and practitioners—for example, effects on health status or function.⁴

To measure appropriateness, colleagues and I at the RAND Corporation and the University of California, Los Angeles, have developed an explicit method, beginning with a literature analysis that summarises what is known about a procedure's efficacy, effectiveness, indications, cost, and use. The next step is to develop a list of specific clinical indications based on that review. Using the list of indications and the literature review, a panel then rates appropriateness on a scale of 1 to 9. On the basis of these ratings and clinical data collected from medical records we can measure appropriateness in actual practice.

Some of the findings have been worrying. For example, among Americans aged over 65 being treated in the fee for service system, carotid endarterectomy was performed for reasons that were equivocal, at best, in two thirds of cases.

The same was true for upper gastrointestinal endoscopy and coronary angiography in about one in four cases.⁵ In a randomly selected group of hospitals in the western United States the proportion of coronary artery bypass surgery that was inappropriate or equivocal varied among hospitals from 23% to 63%.⁶ In a study in the Trent region of Britain coronary angiography and coronary artery bypass operations were performed for inappropriate or equivocal reasons in about half of cases.⁷ And the same was true in the North West Thames region for 60% of cholecystectomies—regardless of whether they were performed in the public or private sector.⁸ Studies of the underuse of necessary care are now beginning; their previous absence is disturbing.

Two important conclusions may be drawn from the research. Firstly, inappropriate care is there if you look for it, and, more importantly, restricting the volume of care by global budgeting or planning does not eliminate it.² Secondly, the rates of less than appropriate care are too large to be ignored.

How could appropriateness ratings revolutionise health care? Purchasers could decide to buy services only from doctors who agreed to operate within guidelines based on appropriateness, or services that satisfied generally accepted criteria of appropriateness. Ratings could also be used to prevent the underuse of necessary care. Decisions about licensing and recertifying doctors could be partly based on audit of the appropriateness of the care provided.

As a doctor, I hope that doctors will use appropriateness guidelines to improve the care that they deliver. Suppose that, when a patient was being considered for one of the most common 100 or so procedures, this happened: the doctor and the patient would take a few minutes to enter into the office computer all the clinical data that were critical to determine whether the procedure should be done. In a few seconds the

computer could produce an appropriateness rating, an analysis explaining the rating, and an indication of the basis for the rating (that is, mostly scientific literature or expert opinion). The patient and doctor could do their own sensitivity analysis (that is, examine with the aid of the computer how changes in the patient's symptoms, signs, or responses to treatment would alter the appropriateness of the procedure) and explore extenuating clinical circumstances.

Of course, the above process represents only a starting point. None the less, it is time to assure our patients that, before they are subjected to a procedure or denied its use, its appropriateness has been explicitly verified. Methods to assess appropriateness are available. It is time they were used by doctors to eliminate both underuse and overuse of clinical interventions.

ROBERT H BROOK
Director, health sciences program, and
professor of medicine, UCLA

The RAND Corporation,
1700 Main Street,
PO Box 2138,
Santa Monica, CA 90407-2138,
USA

- 1 Brook RH, Lohr KN. Will we need to ration effective health care? *Issues in Science and Technology* 1986;3:68-77.
- 2 Brook RH, Chassin MR, Fink A, Solomon DH, Koseoff J, Park RE. A method for the detailed assessment of the appropriateness of medical technologies. *Int J Tech Assess Health Care* 1986;2:53-63.
- 3 Brook RH, Lohr KN. Efficacy, effectiveness, variations, and quality: boundary-crossing research. *Med Care* 1985;23:710-22.
- 4 Brook RH, Kamberg CJ. General health status measures and outcome measurement: a commentary on measuring functional status. *Journal of Chronic Diseases* 1987;1:131-65.
- 5 Chassin MR, Koseoff J, Park RE, Winslow CM, Kahn KL, Merrick NJ, et al. Does inappropriate use explain geographic variations in the use of health services? A study of three procedures. *JAMA* 1987;258:2533-7.
- 6 Winslow CM, Koseoff JB, Chassin M, Kanouse DE, Brook RH. The appropriateness of performing coronary artery bypass surgery. *JAMA* 1988;260:505-9.
- 7 Gray D, Hampton JR, Bernstein SJ, Koseoff J, Brook RH. Clinical practice: audit of coronary angiography and bypass surgery. *Lancet* 1990;335:1317-20.
- 8 Scott EA, Black N. Appropriateness of cholecystectomy: the public and private sectors compared. *Ann R Coll Surg Engl* 1992;74 (suppl 4):97-101.

Reforming the Swedish health services

Three different modes of financing and delivering health care scrutiny

In common with many other countries, Sweden is reviewing options for reforming its health services. The report of an expert group set up by the government to examine alternative ways of financing and delivering health services was published last year.¹ In line with the brief provided by the minister of health, the report analysed three models for the future. These models seek to build on the strengths of the existing system while at the same time tackling its weaknesses. A period of debate is now under way, and decisions are unlikely to be taken until after the election in September.

Sweden exemplifies the integrated approach to the provision of health services.² This entails a combination of public finance and public provision. At a local level county councils raise most of the resources for health care through income taxes, and they also manage the provision of hospital and primary care services. Swedish people enjoy ready access to a full range of services, and there is a strong commitment to equity in the delivery of services. Within this system democratic control of health services and accountability to the local public are particularly emphasised. Administrative costs are low, and this enables most of the available resources to be spent on direct patient care.

Against these strengths, several weaknesses have become increasingly apparent in recent years. These include the

existence of waiting lists for some hospital procedures, a perceived lack of choice for patients and responsiveness to users of services, and evidence of inefficient use of resources. Criticism has also been voiced at the relatively low priority attached to primary care and the poor coordination of health care, social care, and social insurance. The Swedish government has responded to these problems by taking several policy initiatives.

In the case of waiting lists, this has entailed the introduction of a guaranteed maximum waiting time of three months for certain hospital procedures. Primary care has been reformed through the development of a family doctor system in which general practitioners are transferring from salaried employment to independent contractor status. And in the case of health care for elderly people the coordination of services has been addressed by giving responsibility and budgets to municipal councils, which also have responsibility for delivering social care.

These national initiatives have gone hand in hand with a series of reforms promulgated at a local level by the county councils. These reforms have been made possible by the decentralised nature of the Swedish system, in which county councils carry the main responsibility for financing and delivering health care. The most significant developments