

pre-menopausal women. Even the amount of physical activity undertaken may have an impact on conditions modulated by inflammation.<sup>5</sup>

Thus, it is apparent that assessment of a population's health is multifactorial and we should consider incorporating measurement of waist/hip ratios and perhaps even physical activity (using a short questionnaire as in the EPIC study) in addition to BMI. Using BMI alone to assess health status in the population may explain the discrepancy seen between BMI measurements of a 'weedy' individual with a protuberant belly (normal BMI) compared with a 'large fit chap with a small tummy' (high BMI).

RP ARASARADNAM

Teaching and Research Fellow  
Human Nutrition Research Centre  
University of Newcastle upon Tyne, Newcastle

#### References

- 1 Calle EE, Rodriguez C, Walker-Thurmond K, Thun MJ. Overweight, obesity and mortality from cancer in a prospectively studied cohort of U.S. adults. *N Engl J Med* 2003;**348**:1625–38.
- 2 Yalcin BM, Sahin EM, Yalcin E. Which anthropometric measurements is most closely related to elevated blood pressure? *Fam Pract* 2005;**22**:541–7.
- 3 Anderson JP, Ross JA, Folsom AR. Anthropometric variables, physical activity, and incidence of ovarian cancer: The Iowa Women's Health Study. *Cancer* 2004;**100**:1515–21.
- 4 Lahmann PH, Hoffmann K, Allen N, van Gils CH *et al*. Body size and breast cancer risk: findings from the European Prospective Investigation into Cancer and Nutrition (EPIC). *Int J Cancer* 2004;**111**:762–71.
- 5 Hauret KG, Bastick RM, Matthews CE, Hussey JR *et al*. Physical activity and reduced risk of incident sporadic colorectal adenomas: observational support for mechanisms involving energy balance and inflammation modulation. *Am J Epidemiol* 2004;**159**:983–92.

#### In response

Thank you for giving us the opportunity to comment on Dr RP Arasradnam's letter, and to Dr Arasradnam himself for his kind and largely supportive comments. The conversation was necessarily edited and shortened. In it we agreed that waist/hip ratio is a better measure of risk than BMI, although the curve must be J-shaped because of the Belsen effect. Charles did consider incorpo-

rating hip circumference in his index. As this is beneficial it would have to be in the numerator and another length measurement must be introduced into the denominator to maintain an index, making it more complicated. If we scale by height<sup>2</sup>, then the index becomes (weight × hip)/(waist<sup>2</sup> × height<sup>2</sup>). The alternative is to use two existing measures and divide ponderal index by waist/hip ratio. The ratio has no dimensions but incorporates waist rather than waist<sup>2</sup>. However, as waist<sup>2</sup>, as a measure of abdominal cross-section (abdominal height being predetermined), is the natural power, this might underestimate the effect of abdominal fat. Only observation in large populations could sort out which is most appropriate. Unless and until that is done, Charles would say 'Keep it simple!' He would suggest that in the meantime we should ban BMI and insist on a health index. He would use hip and waist circumference, but present the ratio as hip/waist, thus making it the greater the better.

The question of the difference between fat and muscle density also came up. The error arising from ignoring the difference is relatively small and largely irrelevant to the argument, as individuals of the same proportions will necessarily have the same proportion of fat. Nevertheless, where one is comparing the muscular with the obese, BMI will underestimate the volume of fat as opposed to muscle. If the conjectures in the conversation are correct, this might suggest that volume-for-volume strong abdominal muscle is even more deleterious than abdominal fat. 'An intriguing thought!' to quote Charles.

COEMGENUS

#### Post-script

The waist-to-hip ratio wins! A recent publication in the *Lancet* has demonstrated its clear superiority over the Body Mass Index as a predictor of myocardial infarction risk world wide.<sup>1</sup> Well done, both Charles and Dr Arasradnam.

EDITOR

#### Reference

- 1 Yusuf S, Hawken S, Ôunpuu S, Bautista L *et al*. Obesity and the risk of myocardial infarction in 27,000 participants from 52 countries: a case study. *Lancet* 2005;**366**:1640–9.

## Clinical & Scientific letters

Letters not directly related to articles published in *Clinical Medicine* and presenting unpublished original data should be submitted for publication in this section. Clinical and scientific letters should not exceed 500 words and may include one table and up to five references.

### Prescribing patterns in acutely admitted medical patients: changes over 10 years

Advances in treating chronic illnesses inevitably lead to polypharmacy and the associated risks of adverse drug reactions and interactions.<sup>1–3</sup> There are surprisingly few data from secondary care on the absolute numbers of drugs that patients are taking. We studied the prescription lists of emergency patients admitted to the department of medicine of a UK district hospital, at two points 10 years apart.

#### Methods

All emergency adult admissions to the medical unit at Wycombe Hospital during the months of April 1994 and April 2004 were identified. The first 100 medical admissions for each study month were analysed. Reason for admission was categorised as cardiac, respiratory, gastrointestinal/hepatic, neurological or miscellaneous (endocrine, musculoskeletal, falls, thromboembolic disease, miscellaneous infections, etc). Patient records were scrutinised for the numbers and types of prescribed drugs on admission and on discharge during the two study periods.

Based on the frequency of administration, the total number of daily drug doses was also calculated. Drugs administered 'as required', eg nitrolingual spray, were arbitrarily counted as one dose per day, for the frequency of drug dose. Simple analgesics and non-prescription medicines were not included. Drug types were classified by indication as listed in the chapters of the

*British National Formulary*. Antiplatelet drugs (aspirin, clopidogrel) and warfarin were classified separately.

## Results

Admission reason and length of stay were similar in the patient samples from 1994 and 2004 (see Table 1). Patients admitted in 2004 were older. The median (interquartile range) number of prescribed drugs taken by acutely admitted patients at the time of their admission doubled from 2 (0–4) in the 1994 patient sample to 4 (2–7) in the 2004 patient sample ( $p < 0.0001$ ). Accordingly the number of daily drug doses at the time of admission increased from 2.5 (0–6) to 6 (4–11) drug doses per day ( $p < 0.0001$ ). Patients were discharged with 3 (2–5) drugs in 1994 and 5 (3–8) drugs in 2004 ( $p < 0.0001$ ). Correspondingly the number of daily drug administrations on discharge increased from 4 (2–8.5) to 8 (4–12) ( $p < 0.0001$ ).

Treatment of, and prophylaxis against, cardiovascular disease accounted for much of the increased drug prescribing. More than one-third of patients requiring emergency admission in 2004 were discharged with an antiplatelet agent and one-sixth were discharged with warfarin.

## Discussion

This snapshot of prescribed drugs in acute medical patients quantifies the increased prescribing relating to emergency medical admissions over the past decade. Notably patients admitted as acute medical emergencies are now discharged on a median of five different drugs and eight different drug doses per day. Some patients were discharged with more than 20 different drug administrations per day. Advancing age and its association with the increased likelihood of having and receiving drug treatment for chronic illness account for some of the increased prescribing.<sup>4,5</sup> Other factors include newer treatments, wider indications for various cardiovascular drug classes and increased use of primary and secondary preventive prescribing strategies, particularly in atheromatous cardiovascular disease.<sup>5</sup>

Apart from the complexity that multiple drug regimens present to elderly patients at the time of their discharge home, the increased polypharmacy will inevitably

lead to more adverse drug reactions and interactions and an increased risk of non-compliance outside hospital. While the complexities of modern medicine would seem to demand it, clinicians must remain mindful of the potential dangers of polypharmacy.

DAVID D GORARD  
Consultant Physician

ANNIKA S KIND  
House Officer

Wycombe Hospital  
High Wycombe, Buckinghamshire

## References

- 1 Classen DC, Pestotnik SL, Evans RS, Lloyd JF, Burke JP. Adverse drug events in hospitalized patients. Excess length of stay, extra costs and attributable mortality. *JAMA* 1997;277:301–6.
- 2 Pirmohamed M, James S, Meakin S, Green C *et al.* Adverse drug reactions as a cause of admission to hospital: prospective analysis of 18820 patients. *BMJ* 2004;329:15–19.
- 3 Lazarou J, Pomeranz BH, Corey PN. Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. *JAMA* 1998;279:1200–5.
- 4 Fries JF. Aging, natural death, and the compression of morbidity. *N Engl J Med* 1980;303:130–5.
- 5 Linjakumpu T, Hartikainen S, Klaukka T, Veijola J *et al.* Use of medications and polypharmacy are increasing among the elderly. *J Clin Epidemiol* 2002;55: 809–17.

**Table 1. Features of patients at the time of admission and discharge in 1994 and in 2004.**

	April 1994		April 2004	
Male/female	49/51		45/55	
Age [median (IQ range)]	61 (51.5–74) years		71 (57.5–79.5) years*	
Length of stay	4 (2–6) days		3 (1–7) days	
Reason for admission				
Cardiac	32		29	
Respiratory	21		25	
Gastrointestinal	10		12	
Neurological	6		10	
Miscellaneous	31		24	
	Admission	Discharge	Admission	Discharge
No. drugs/day	2 (0–4)	3 (2–5)	4 (2–7)*	5 (3–8)**
No. doses/day	2.5 (0–6)	4 (2–8.5)	6 (4–11)*	8 (4–12)**

\*  $p < 0.01$  v 1994 sample. \*\*  $p < 0.0001$  v 1994 data