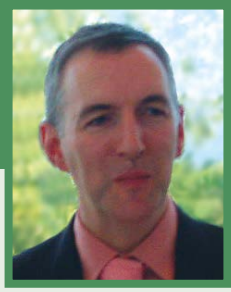

Pretending to see the future?

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The advent of computers and linked databases has lead to a plethora of meta-analyses and similar mega studies. I can think of few studies with as many participants as the main subject of this quarter's editorial (summarised alongside). Hippisley-Cox and Coupland reviewed data on nearly half a million people with diabetes from general practice in England to develop a model to predict the subsequent risk of blindness and the occurrence of a major lower limb amputation.

The best predictors of blindness in men and women included age, total:HDL cholesterol ratio, blood pressure, HbA_{1c}, social deprivation, duration and type of diabetes, and presence of chronic kidney disease, proliferative retinopathy or maculopathy. Pre-existing eye disease was, unsurprisingly, the strongest predictor of future blindness.

The predictors of amputation were different for men and women. For both genders they included age, systolic blood pressure, HbA_{1c}, social deprivation, diabetes duration, smoking status, ethnicity, rheumatoid arthritis, congestive heart failure, pre-existing peripheral vascular disease and chronic renal disease. Additional risk factors in men only were the type of diabetes and the presence of atrial fibrillation. I think most foot care practitioners, if asked to come up with a list of likely predictors, would have included the majority of these. Interestingly, factors such as BMI and cholesterol level did not predict amputation risk.

The authors then used these risk factors to develop a predictive algorithm which, if the values are entered into a web-based program, generates the absolute risk of blindness or amputation. This is my main concern. What do we do with such numbers? For heart disease, for example, the 5-year or 10-year risk levels at which statins and other cardiovascular risk reduction strategies are employed are not only balanced with the adverse effects of treatment but can also be modified by a single intervention.

What are we to do with the output from this algorithm? What is an acceptable risk of amputation? How do we modify factors such as deprivation, ethnicity, heart failure or rheumatoid arthritis? How do we approach our patients to have a sensible debate about what is and is not changeable to reduce their risk, and are we equipped with the communication skills to do so? A paper which sets out to provide answers to these questions may actually be demanding even more from our practice. ■

BMJ

New algorithm to predict risk of amputation and blindness

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! Factor	✓✓✓✓✓

1 These authors developed an algorithm to predict the risk of blindness and lower limb amputation in people with diabetes using data from two large general practice databases.

2 The algorithm was developed using data from 454 575 people with diabetes and validated using data from a further 348 469.

3 For blindness, significant factors identified were age, systolic blood pressure, cholesterol:HDL ratio, HbA_{1c}, deprivation, diabetes duration, type of diabetes, chronic kidney disease, and existing proliferative retinopathy or maculopathy, with individual hazard ratios (HRs) ranging from 1.03 to 2.93.

4 For amputation, the significant factors were age, systolic blood pressure, HbA_{1c}, deprivation, diabetes duration, smoking, ethnicity, rheumatoid arthritis, congestive heart failure, peripheral vascular disease, and chronic renal disease. In addition, type 1 diabetes and atrial fibrillation were significant in men only.

5 Interestingly, BMI did not predict either outcome, smoking did not predict blindness and cholesterol:HDL ratio did not predict amputation.

6 The risk equations were well calibrated in both validation cohorts, with good discrimination in men and women for both amputation and blindness.

7 An online calculator to determine risk using this algorithm can be accessed at: http://qdiabetes.org/amputation-blindness.

Hippisley-Cox J, Coupland C (2015) Development and validation of risk prediction equations to estimate future risk of blindness and lower limb amputation in patients with diabetes: cohort study. *BMJ* **351**: h5441

Diabetes Metab Res Rev

PAD characteristics as predictors of wound healing and amputation

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! Factor	✓✓✓✓✓

1 In this systematic review and meta-analysis, the authors sought to determine whether specific measurements of peripheral artery disease (PAD) could be used to predict wound healing and risk of amputation.

2 In total, 11 studies reporting on 5890 people with diabetic foot ulceration were evaluated. In these, annualised healing rates ranged from 18% to 61% and major amputation rates were 3–19%.

3 In 10 studies with wound healing as an outcome, skin perfusion pressure ≥40 mmHg, toe pressure ≥30 mmHg and a transcutaneous oxygen pressure ≥25 mmHg were all associated with a ≥25% greater chance of healing.

4 In four studies with major amputation as an outcome, ankle pressure <70 mmHg and fluorescein toe slope <18 units both increased the risk by around 25%. The combined test of ankle pressure <50 mmHg or an ankle–brachial index <0.5 increased the likelihood of major amputation by approximately 40%.

5 The authors note that the quality of these studies was generally poor and there is a need to standardise individual participant data in future studies.

6 Nonetheless, they conclude that these PAD markers provide a useful indicator of healing likelihood and amputation risk, and can be used with pre-test probability measures to guide subsequent treatment strategies.

Brownrigg JR, Hinchliffe RJ, Apelqvist J et al (2016) Performance of prognostic markers in the prediction of wound healing or amputation among patients with foot ulcers in diabetes: a systematic review. *Diabetes Metab Res Rev* **32**(Suppl 1): 128–35

Diabetes Care

Telemedicine versus standard care for outpatient monitoring of DFUs

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! Factor	✓✓✓✓✓

1 In this randomised controlled trial, telemedical monitoring of diabetic foot ulcers (DFUs) was compared with standard outpatient care.

2 Standard care comprised outpatient consultations with municipal nurses under the supervision of a specialist nurse, while the telemedicine group received cycles of up to two of these consultations at home over telephone or online, supplemented by uploaded images of the DFU, followed by a mandatory clinic visit. Treatment pathways were flexible according to clinical need.

3 Participants remained in the study until DFU healing, amputation or death. If they met none of these endpoints within 1 year, the DFU was considered chronic and they were removed from the study.

4 Overall, 72% of participants in the telemedicine group and 73% in the control group had complete healing, and 11% and 14%, respectively, required amputation.

5 After adjustment for age, gender and municipality, there was no difference in terms of wound healing (hazard ratio [HR], 1.11; 95% confidence interval [CI], 0.87–1.42) or amputation rates (HR, 0.87; 95% CI, 0.54–1.42).

6 However, eight people died in the telemedicine group compared with one in the control group (HR, 8.68; 95% CI, 6.93–10.88).

7 On the basis of this, the authors recommend a cautious approach to the use of telemedicine in the monitoring of diabetic foot ulcers.

Rasmussen BS, Froekjaer J, Bjerregaard MR et al (2015) A randomized controlled trial comparing telemedical and standard outpatient monitoring of diabetic foot ulcers. *Diabetes Care* **38**: 1723–9

Diabetes Care

Do other diabetes complications explain the higher rate of death after amputation?

Readability	✓✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! Factor	✓✓✓✓✓

1 In this longitudinal cohort study of people enrolled in a UK general practice registry, the authors sought to determine whether other diabetes complications that are known to be associated with death were responsible for the high mortality risk observed in people who undergo an amputation.

2 After exclusion of people who died within 2 weeks of the procedure (to eliminate pre-existing sepsis or perioperative complications from the analysis), 6566 people with diabetes who underwent amputation were compared with 409 868 who did not.

3 Over an average follow-up of 9 years, the hazard ratio (HR) for death from any cause was 3.02 in the amputation group.

4 Adjustment for comorbidities including age, chronic kidney disease, Charlson comorbidity index, myocardial infarction, stroke, peripheral vascular disease, congestive heart failure, smoking, HbA_{1c}, malignancy and gender reduced this HR by only 22%, to 2.37.

5 Sensitivity analysis showed it was unlikely that there was an unmeasured confounder that could fully explain the association of amputation with death.

6 The authors conclude that the high mortality rate after amputation remains mostly unexplained. They suggest that this patient group requires even more vigilant follow-up and evaluation to assure that their medical care is optimised.

Hoffstad O, Mitra N, Walsh J, Margolis DJ (2015) Diabetes, lower-extremity amputation, and death. *Diabetes Care* **38**: 1852–7

> ***"The authors conclude that these peripheral artery disease markers provide a useful indicator of healing likelihood and amputation risk, and can be used with pre-test probability measures to guide subsequent treatment strategies."***