lenses: the corneal oedema that occurs with extended wear causes separation of epithelial bridges and disruption of mucus.

The earliest sign of infection is at the epithelial level, with patchy oedema. This causes an irregular dendritiform ulceration, which is often misdiagnosed as keratitis due to Herpes simplex virus. There is, however, less branching and a wider base. The clue to the correct diagnosis is that the patient is young and wears contact lenses; herpetic ulceration is rare in this group. Superficial infiltrates then appear in the underlying stroma. The epithelium may heal but appears oedematous and is easily debrided. At the same time linear infiltrates may be observed along one or more corneal nerves, and this is believed to be the cause of severe pain—out of proportion to the signs. If left untreated the amoebas penetrate the full depth of the cornea, forming a ring abscess, which may eventually lead to perforation. Most patients have antibodies to acanthamoeba, but the immune system alone seems unable to halt progressive corneal infection.

Successful medical treatment, with propamidine and neomycin, was first described 10 years ago,⁸ but for treatment to be effective early diagnosis is required. Resistance, associated with temperature sensitivity,⁹ and failure of treatment may both occur. Recent work has shown acanthamoebas to be sensitive to the biguanide antiseptic chlorhexidine and to polyhexamethylene biguanide, which is sold as a disinfectant for swimming pools.¹⁰ Both biguanides have been combined with propamidine and used successfully to treat acanthamoeba keratitis.^{4,11} This combination gives a more rapid therapeutic response than neomycin (to which cysts are usually resistant). While polyhexamethylene biguanide has been applied topically in an artificial tear complex, chlorhexidine has been applied in physiological saline; neither is ideal for topical ocular treatment, and more research is needed.

Preventing acanthamoeba keratitis occurring because of infection from natural sources remains impossible,² but early recognition and treatment with 0.02% chlorhexidine (ideally with propamidine as well) should prevent blindness. Preventing infections associated with contact lenses is theoretically possible but will be difficult to achieve. It depends on the use

of an effective amoebicidal disinfectant. Among the many marketed only two cold chemical disinfectants (hydrogen peroxide and chlorhexidine) are effective against acanthamoeba cysts and most bacteria found in storage cases.¹² Both should be used as sterile solutions and not dissolved in tap water. While also effective, thiomersal is not recommended because it can induce hypersensitivity. Storage cases should be washed daily with boiled-cooled water (at 70°C) and kept dry when not in use to prevent amoebic and bacterial multiplication. This procedure needs to be explained to both the people who fit contact lenses and their patients. Finally, compliance is required by those who wear contact lenses—but is often lacking in young people, who buy “disposable lenses” and then wear them for 14 days. The future development of sterile contact lenses that are disposed of properly each day may be expected to reduce the occurrence of this infection. In addition, extended wear of any contact lens overnight should be avoided.

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Towards investing in health gain

The finest strategies must be backed up with the best science

The main task of NHS purchasers should be to reshape services to achieve the greatest possible improvements in their population's health. The obstacles to that endeavour are many. They include the scientific problems of measuring the effectiveness of, and hence need for, clinical interventions¹⁻³ and the political problems of bringing about changes in the teeth of fiercely held interests. As relatively small organisations, purchasers need all the help they can get with the sheer complexity of altering so many interlocking aspects of provision of the health services while meeting the many other demands of their new role.

Coming to their rescue is the Welsh Health Planning Forum's recently completed series of protocols for investment in health gain,⁴⁻¹⁷ which summarises the science and mobilises the political will. The series highlights both the advantages and the pitfalls of such an initiative being taken centrally in the NHS. The advantages are obvious: the initiative has led to a lucid set of syntheses that identify many points where

change is needed and to a Welsh health service deeply imbued with the proclaimed values of “health gain” (a much used term attributed to this group), “people centredness,” and “resource effectiveness”—the three pillars on which the whole Welsh enterprise was built. But the pitfalls are also evident: a plethora of targets only partially supported by the available evidence. Moreover, the series might reinforce the impression that informed consensus can substitute for scientific proof and that slim, polished documents can by themselves solve the complex problems facing purchasers. Nevertheless, the protocols are a splendid way of stimulating the service to consider the actions that might be needed.

It all began in 1989 with the Welsh Office's *Strategic Intent and Direction*,¹⁸ which, together with *Local Strategies for Health*,¹⁹ stated what was generally required and explained how to set about achieving it. These rousing statements helped to set the framework—amid much razzmatazz—for “taking the people of Wales into the 21st century with a level

of health comparable with the best in Europe.” Given that Wales was starting from a long way behind, such rhetoric was justifiable in that it captured many influential hearts and minds. (Indeed, it helped set the pace for the subsequent *Health of the Nation* initiative in England.)

Together with supporting technical papers, the protocols were each produced by three multidisciplinary expert panels aided by British opinion leaders and driven by tight deadlines. The political imperative to deliver the product on time inevitably meant that some of the consensus was hurried through, especially given the unaccustomed novelty of gaining collaboration from doctors, managers, and many other parties. Despite the pressures the planning forum wrote the documents quickly and elegantly.

Each clarified the components of health gain in its particular field (for example, cancers, cardiovascular disease, and injuries) and helped steer the health service towards the topics that needed rethinking. The documents brought together the whole range of health care from health promotion through to rehabilitation and palliative care. Yet they were short enough to allow their intended audience—members of health authorities and other policymakers—to grasp most of the important areas where there was room to achieve improvements in health. Furthermore, with the advent of purchasing in 1991, that audience was now in a position to raise those issues in their contracts with providers of health care. Indeed, the chosen “health gain areas” are now central requirements in Welsh purchasing plans.

A closer look at the content should, however, make the purchasing authorities slightly wary. No evidence is given to support many of the recommendations. This might be excusable in the interests of simplicity if the evidence was present in the technical documents, which are available on request. But a detailed look at these documents raises doubts about the extent to which evidence was reviewed systematically. For example, a close examination of the document on injuries showed that only 13 out of 140 recommended interventions were supported by quoted references.²⁰

So where is the evidence?

Maybe the evidence was thoroughly reviewed but not quoted. Maybe, because of the rush that was imposed on the process, it was only partly and uncritically reviewed. Or maybe, as an estimated 85% of medical interventions have never been scientifically shown to be effective,²¹ the evidence simply doesn't exist. Purchasers should not have to guess which of those is the reason for the omission. In fact, there are enough hints to suggest that the authors have not always been sufficiently critical of the available data when making their assertions.

This should raise doubts about the strength of those assertions and the exhortations that stem from them, some of which have controversial or expensive implications. It is therefore a pity that the authors did not separately rank the strength of the evidence as well as the strength of the recommendations, as has been done in North America.^{22 23} This would have added to the value of the documents by exposing the many deficits in the scientific basis of health policy, highlighting where NHS research and development could best help purchasers of health care.

The documents pose problems for health authorities in

setting so many health targets, many of which would be difficult or expensive to measure reliably.²⁰ This is not merely a scientific criticism but also a managerial one. Targets are best used to focus action,²⁴ and limiting the target areas—as in the selective approach taken by the English *Health of the Nation*—is preferable.

In contrast, Welsh health authorities have been faced with many dozens of strong exhortations that cannot possibly all be met—hardly the best way to help with an already difficult task. Such “top down” target setting also undermines the protocols’ hard won local feeling of “ownership” if they convey a sense not of helpful guidance for overwhelmed purchasing authorities but of yet more demands from the centre. If such protocols are to help purchasers make difficult decisions they should offer them reliable information without pressing them towards hasty action.

In short, this has been an important early step in helping managers, doctors, and patients to confront the need to change the shape of services to improve the population's health. But the initial balance was perhaps too much towards the political pressure to get things done rather than the scientific need to get things right. To make the most of the considerable achievements of the Welsh Health Planning Forum they and the NHS as a whole now need to step back from the headlong rush to change things and to invest time and resources in consolidating the scientific basis of those changes.

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