Personal paper: how to get the best health outcome for a given amount of money

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Increasingly, healthcare programmes are evaluated in terms of both their costs and outcomes. However, existing evaluation designs, in which equal numbers of participants are compared, remain a hangover from the time when outcomes were the sole concern. Outcome maximisation studies, in which costs are equalised, are an alternative way of comparing the costs and consequences of health interventions. They may be feasible in some instances and are attractive because they highlight two of the main messages of health economics.

Firstly, economists emphasise that their concern for the costs of interventions is due to the implications of opportunity costs—that is, resources used for one intervention should be compared with the potential benefits achievable by the next best option that is forgone because the resources for health care are finite.[1-3] In an outcome maximisation design the opportunity costs of high cost interventions would be highlighted more clearly in the study results.

Secondly, the marginal costs of implementing programmes do not necessarily equal average costs, in which marginal costs are the change in costs resulting from a small change in the level of provision.[4] By evaluating alternative technologies at comparable levels of expenditure, outcome maximisation studies would take account of the fact that programme costs often do not rise proportionally with the number of patients treated.

Summary points

Health care evaluations used to focus solely on outcomes, but increasingly they have compared the costs of competing interventions

Popular study designs in which equal numbers of people are subjected to each regimen at different levels of total cost do not reflect this innovation

An outcome maximisation design, in which the costs allocated to each programme are equal, might be appropriate

This design has two main advantages: (*a*) the opportunity costs (or next best use) of more resource intensive treatments are readily expressed in terms of units of benefit forgone and (*b*) the real life choice of allocating a fixed level of resources to different programmes is considered

One likely consequence of this design is that different numbers of subjects receive the different treatments

This is not less ethical than traditional study designs if ethical consideration is extended to those not receiving treatment

Study designs for economic evaluations

Published work in health economics lists four types of economic evaluation: cost minimisation, cost effectiveness, cost-benefit, and cost-utility analyses.[1] Differences between the studies relate to the way in which the consequences are considered. Cost minimisation studies are based on the assumption that the outcomes from the different interventions are not significantly different. As this assumption should be based on evidence, cost minimisation analysis is often undertaken after a clinical trial. The remaining three approaches are applicable when the outcomes are not equal. As shown in the first box on the next page, these differences pertain to whether there are multiple outcomes of interest and to how these multiple effects are to be measured on a common scale. In all cases if any aspect of the study is controlled it is that equal numbers of individuals are treated by the different options. This permits testing of a null hypothesis of no difference in outcome between the alternatives.

Broadly, economists describe the objectives of economic analysis in two ways—either as securing a given level of outcome at least cost or as maximising outcome from a fixed level of resources.[5] However, the taxonomy of possible study designs in the box includes only those which consider securing a given level of outcome at least cost; as the outcomes from various programmes cannot be set as equal, cost minimisation studies will be rarely applicable.

Instead, studies maximising outcome from a fixed level of resources may be more pragmatic. Thus, it may be plausible to hold constant the total resources or significant cost components—for example, staff time—devoted to each arm of the trial and adopt an outcome maximisation design. The three different ways of assessing outcomes listed in the first box would

Current designs of economic evaluations[1]

- Cost minimisation analysis: evidence is sufficient to assume that the outcomes from the alternatives are equal. Programmes are judged on the criterion of least cost
- Cost effectiveness analysis: the alternatives are judged on a single outcome. This may be achieved to different degrees by the alternatives. Programmes are ranked using cost effectiveness ratios—for example, cost of intervention per problem free drinker
- Cost-utility analysis: several outcomes are produced by the alternatives. They may be produced to different degrees and some outcomes may not apply to all alternatives. The multiple outcomes are combined using preference weights. Programmes are selected on the basis of comparisons of costs per unit of outcome—for example, per quality adjusted life year (QALY)
- Cost-benefit analysis: outcomes are produced as in cost-utility analyses, but the multiple outcomes are combined using monetary values. Programmes are ranked using cost-benefit ratios. Because benefits are measured in the same units as costs programmes can be judged to be worth while overall—that is, whether the value of the benefits produced exceed the value of the resources consumed

Proposed outcome maximisation designs for economic evaluations

- Effect maximisation analysis: equal resources are allocated to each programme. The preferred programme maximises total effectiveness—for example, number of problem free drinkers, number of disability free days
- Utility maximisation analysis: equal resources are allocated to each programme. Multiple outcomes are combined using preference weights. Programmes are selected on the basis of total increase in utility—for example, the total number of QALYs produced
- Benefit maximisation analysis (disbenefit minimisation analysis): equal resources are allocated to each programme. Multiple outcomes are combined using monetary values. The programme producing outcomes of most value is recommended. If the value of the benefits is less than the value of the resources used the criterion becomes disbenefit minimisation

generate an equal number of possible study types: effect maximisation, utility maximisation, and benefit maximisation analyses (when total benefits are less than total costs a benefit maximisation analysis becomes a disbenefit minimisation analysis). The second box summarises the principal features of these new study designs. Essentially, the (equalised) resources in each arm of the trial would be used to treat as many people as possible and competition would be based on some measure of the total amount of benefit produced. This does not have to be a simple summation across people,[2 3] although this is the standard approach implicit in cost effectiveness or cost-benefit ratios.

Table 1 Hypothetical results from effect maximisation study comparing brief and more intensive intervention for alcoholism

Programme	Staff time (full time equivalent)	Estimated No of subjects treated	Rate of problem free drinking (%)*	No of problem free drinkers
Outpatient	1.5	10†	28.6	3
Confrontational interview	1.5	72‡	22.2	16

*Based on Chapman and Huygens.[8]
†Based on twice weekly sessions for two groups of five subjects run by a multidisciplinary team of three half time workers over six weeks.
‡Based on two hourly sessions at a rate of one each per day for four days a week by three half time workers over six weeks.

Outcome maximisation study of brief and intensive interventions for alcoholism

By way of example, consider recent reviews of brief and intensive interventions for alcohol misuse.[5 6] Notwithstanding considerable debate about whether brief interventions are truly brief,[7] the primary purpose is to test the null hypothesis—that there is no significant difference in the outcome from the two alternatives. With a cost minimisation approach and if the null hypothesis is not rejected, the choice can be based on the obvious cost advantage of brief interventions.[6]

For example, Chapman and Huygens found no significant differences in various outcome measures between alcoholic patients offered a six week outpatient programme or a two hour confrontational interview.[8] At 18 month follow up, 29% of the 22 subjects in the outpatient group had problem free drinking compared with 22% of the 26 subjects in the confrontational interview arm. This difference was reported to be insignificant.

Chapman and Huygens do not report the amount of resources used in each arm of the study.[8] However, the results from an effect maximisation design may be estimated by holding staff resources constant at 1.5 full time equivalent workers over six weeks, estimating the number of subjects who could be treated by each alternative, and using the reported rates of problem free drinking (table 1).[8]

Clearly, more subjects can be treated in the confrontational interview programme within these fixed resources. Given the comparatively small difference in rates of problem free drinking between the programmes, the advantage of the confrontational interview over the outpatient programme in terms of cost also emerges in the number of subjects for whom the programmes produce a successful outcome (16 *v* 3). The opportunity costs of allocating 1.5 full time equivalent workers to the outpatient programme, when they could have been assigned to conducting the confrontational interviews, is a successful outcome for 13 subjects. This seems a more intuitive and persuasive way to present opportunity costs than highlighting the monetary value of the resources that could have been saved.[9]

This type of study design better represents the decision problems faced in health services as it compares alternative uses of a predetermined budget. A further advantage of this approach is that it is explicit in considering the production of outputs from inputs in different health technologies at a particular input. Therefore, if cost per subject varies with the number of subjects—for example, for certain interventions savings are possible by treating many patients—the costs and consequences will be evaluated at comparable levels.

For example, the sample problem (table 1) could be reconsidered for the case in which four part time (two full time equivalent) workers are available. In the one to one intervention (confrontational interview) it may be possible to react to this marginal increase in resources by treating more subjects, whereas additional group sessions may not be possible in the outpatient arm with only one extra worker. Therefore, the number of problem free drinkers resulting from the confrontational interview rises to 21 and the opportunity costs of

allocating four part time workers to the outpatient intervention would be a successful outcome for 18 patients.

Opportunity costs and ethical implications of outcome maximisation studies

The ethics of randomisation are based on a lack of evidence on the superiority of any alternative and equal chances for each subject of receiving the treatment that emerges as superior. One probable feature of an effect maximisation design is that different numbers of people would be treated in each arm of the study. Would outcome maximisation studies therefore be unethical?

An extension of ethical concerns to opportunity costs suggests not. Williams has argued that all those affected by clinical decisions (including those missing out on those resources) must be the subject of ethical considerations because the resources for health care are limited and choices must be made between potential patients.[2] Table 2 shows the ethical implications of traditional study designs once the opportunity costs in the next best treatment alternative (intervention *x*) are considered. Owing to the different amounts of resources allocated to each study arm, a different number of people are subjected to the consequences of each alternative. Effectively, different numbers of individuals are allocated to missing out on treatment in traditional study designs. Therefore, these designs cannot be considered more ethical than ones in which the level of resources is equalised across study arms.

Table 2 Effective allocation of study participants to different treatments in traditional study design[8]

Programme	No of subjects	Staff time	No of individuals who could have received intervention *x* with that staff time*	Effective total No of study participants
Outpatient	22	4.5†	90	112
Confrontational interview	26	0.75‡	15	41

*Given that 20 people can be treated by one full time equivalent worker.
†Based on three half time workers running sessions for two groups of five subjects every six weeks, implying 18 weeks of staff time is required for 22 subjects.
‡Based on three half time workers counselling one subject each per day on four days a week, implying three weeks of staff time is required for 26 subjects.

Conclusions

There may be no additional ethical problems associated with holding costs constant in outcome maximisation studies. Also, this approach may be preferable because, as with many real life decisions, the evaluation focuses on competing options for a fixed level of resources. Moreover, input is explicit in the study design and it is obvious for what allocation of resources the results are relevant. Furthermore, it highlights the disadvantages of high cost interventions by showing opportunity costs in natural units of outcome—for example, number of problem free drinkers—and, by reducing the amount of cost analysis required, returns us to the good old days of outcome maximisation.

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Any questions

How quickly can hypnotics be withdrawn?

How quickly can you withdraw hypnotics (especially benzodiazepines) from elderly patients admitted to hospital for management of acute illness? Is there any evidence that withdrawal should be gradual?

The precise incidence of withdrawal reactions to hypnotics is uncertain, although it has been suggested that at least 10-15% of patients taking benzodiazepines long term develop clinically significant withdrawal reactions when they stop treatment. Rebound insomnia is even more common. The particular problem facing the hospital doctor is knowing how much hypnotic use has contributed to an acute admission. This is particularly so in elderly people, where confusion and postural instability may often be related to benzodiazepines, and where hypnotics may also contribute to disease processes—for example, by increasing respiratory depression in patients with chest disease.

The issue is further complicated by the type of hypnotics that the patient has been receiving. For example, longer half life benzodiazepines, such as diazepam, are less likely to cause acute withdrawal syndromes than shorter half life drugs.

In patients who have been clearly documented to have benzodiazepine dependence gradual withdrawal is important. Several regimens have been suggested, but generally withdrawal should be over a period of weeks or even months. The uncertainty lies with knowing which patients are going to get withdrawal symptoms, and therefore in practice it is probably best not to stop hypnotics acutely, unless there are other intercurrent illnesses which are contraindications to their use. Withdrawal should be at a rate determined by the patient's symptoms. For benzodiazepines this is most readily achieved by slow reduction in dose, using diazepam.

Withdrawal of non-benzodiazepine hypnotics can be achieved by gradual reduction in the number of nights per week for which these drugs are administered. This process requires the collaboration of the patient and support from the prescriber.

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Managed care

Disease management

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This is the last in a series of three articles aiming to raise understanding of the issues surrounding managed care

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Summary

The disease management approach to patient care seeks to coordinate resources across the healthcare delivery system. The growing interest in evidence based medicine and outcomes, and a commitment to integrated care across the primary, secondary, and community care sectors, all contribute to making disease management an attractive idea. A combination of patient education, provider use of practice guidelines, appropriate consultation, and supplies of drugs and ancillary services all come together in the disease management process. But its effectiveness is largely untested, so evaluation is essential.

Introduction

Disease management is often regarded as one of the ways of achieving managed care, but it can also be viewed as a stand alone mechanism aimed at improving the cost effectiveness of care. Clinical pathways and integrated care packages are other terms used to describe a disease management approach. Examples of how a good disease management programme would work for a patient with diabetes mellitus is shown in the case history given in boxes throughout the paper.

What is disease management?

Disease management views patients as entities experiencing the clinical course of a disease, rather than viewing their care as a series of discrete episodes or as fragmentary encounters with different parts of the healthcare system. It has three parts:

- A knowledge base that quantifies the economic structure of a disease and includes guidelines covering the care to be provided, by whom, and in what setting for each part of the process;
- A care delivery system without traditional boundaries between medical specialties and institutions; and
- A continuous improvement process which develops and refines the knowledge base, guidelines and delivery system.[1]

It is a structured systems response to a set of problems which are evident to some degree in all healthcare systems. These include a fragmented and uncoordinated set of arrangements for delivering care, a strong bias towards acute treatment, a neglect of preventive care, and inappropriate treatment. In an attempt to overcome some of these problems, disease management is outcomes led. This is its major strength and its major weakness. The weakness lies in our incomplete knowledge base. For many conditions there is no consensus about outcomes, or whose outcomes should prevail—those of professionals or patients.

For which diseases is a managed approach suitable?

Disease management is most suitable for the diseases about which most is known, for which it is easy to develop disease protocols that are evidence based, and in which it is possible to measure outcomes. The most typical disease favoured for this approach is diabetes, followed by heart disease and cancer. Stroke, asthma, mental health (including depression), prostate disease, and dermatological diseases are also often candidates. Angina, AIDS, cystic fibrosis, hypertension, renal dialysis, substance misuse, and peptic ulcers are less commonly managed. Senior NHS managers surveyed in 1995 said that the principal reasons for choosing diseases are a high local incidence of disease; the need for integrated guidelines and systems in primary and secondary shared care; the high cost of treatment; a requirement to improve guidelines; the lack of certainty in best practice; and the need to improve patient outcomes.[2]

The spectrum of disease management extends from health promotion and disease prevention, through diagnosis, treatment, and rehabilitation, to long term care. No published research has explicitly evaluated disease management programmes.[3] The claims for disease management made in most papers have not been tested empirically, and research has been confined to hospital based interventions. This tends to undermine the population based approach which is central to the disease management philosophy.

Setting up a disease management programme

To an extent, disease management is little more than a marketing or packaging device whereby familiar and often long standing concepts are combined into a single philosophy or approach and offered as a complete package. The success of a disease management programme depends on several factors: committed managers, an organisation prepared and willing to take this route, a structured process of change management, a structured approach to analysis, a well developed performance management system—with the patient at the centre of the process.

The purpose of the programme must be clear at the outset, and the organisational structure within which the programme will operate must be established. The skills and resources required must be identified, as well as the diseases to be managed. Links and alliances must be in place at the outset and everyone involved in the process must understand what is going on. It is also vital to review the evidence for each disease in order to ascertain what is known about the disease in each sector of care. Each disease should be broken down into its constituent elements and

protocols produced for each stage. How outcomes are to be measured for each stage of the disease and across all the stages must be determined. Finally, the whole process should be piloted and independently evaluated.

In many respects, disease management should be seen as a learning process. It is likely to advance incrementally through a process of iteration and revision (fig 1).[4]

As with any major change, top managers have to be seen to be taking a lead. But without the ownership and commitment of staff, any new developments will quickly fail or become distorted. Good communication is critical to the success of disease management.

Preparing for the change process requires analysis and an objective assessment at the outset of what the problem is and how it might be tackled. Putting the patient at the centre of the process allows bottlenecks and problems of coordination to be identified. Finding solutions to some of these obstacles and blockages may entail radical change—for example, it may be necessary to address poor patient preparation, inappropriate staffing, and work planning routines, none of which are new to the NHS or to its managers, but unless these problems are confronted and resolved, disease management will not succeed.

Features of successful disease management

- Patient centred and outcome focused
- Objective and evidence based, to ensure credibility and acceptance
- Flexible and pragmatic, to account for normal variations and uncertainties in medical practice at patient level
- Dynamic, to enable evolution and durability
- Based on what happens in the real world and not on what ought to be happening
- Designed to minimise difficulties and maximise benefits

Framework for assessing merits of joint ventures in disease management

- Patient issues—patients' interests should be paramount
- Ethical issues—there should be no conflict with ethical requirements of practitioners to provide whatever treatment they consider clinically necessary for an individual patient
- Protection and use of patient information
- Legal issues—NHS parties should satisfy themselves as to the legality of any proposed venture
- Transparency and accountability—services specified in a joint venture should be published and NHS parties held accountable for them
- Finance issues—joint ventures should represent value for money to the NHS
- Evaluation—joint venture schemes should include arrangements for monitoring and evaluation

Skills and tools needed for disease management

Disease management programmes depend on a diverse set of skills and tools.[6]

Knowledge base—Up to date information about disease in terms of epidemiology screening, prevention, pathology, and treatment options is clearly essential. Many stakeholders will already be knowledgeable but there may need to be even more specialisation around particular conditions for greater cost effectiveness.

Outcomes research—In many ways outcomes research is the raison d'être of disease management. It means measuring quality, service or satisfaction, and cost outcomes for any course of treatment, and disseminating this information to develop clinical guidelines and protocols. But this poses a dilemma. Few systems based outcomes data are available, and even when they are, changing clinicians' behaviour will demand management skills of the highest order. Some managers are attracted to the idea of partnerships or joint ventures with pharmaceutical companies that believe they possess these skills.[7]

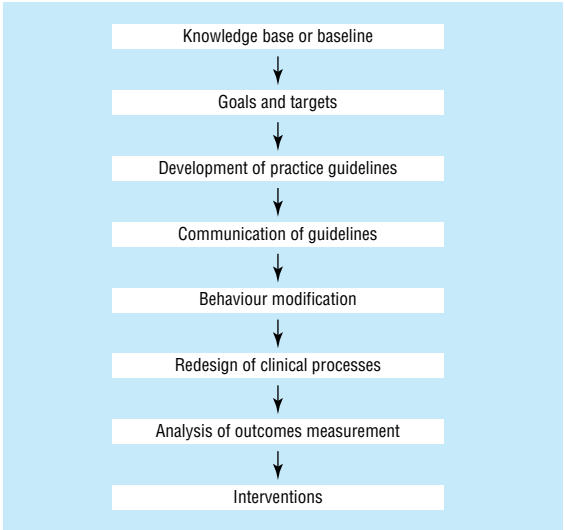

Fig 1 Disease management process

Information systems—Disease management needs all stakeholders to have access to integrated information so they can all understand treatment options, long term costs, and outcomes. Collecting and sharing data must be a priority—currently, information is often unreliable and inaccessible.

Tools for influencing behaviour—Effective, successful integrated health care systems require stakeholders to change their behaviour. For instance, providers will need to respond to clinical practice guidelines—and provide good reasons if they are not prepared to follow them—and patients will need to take compliance more seriously. Some pharmaceutical companies believe they can contribute by influencing the behaviour of patients and providers through educational programmes and other devices.

Continuous quality improvement—Measuring performance against accepted benchmarks will allow the system to be continually refined through regular evaluation.

Ability to share and manage financial risk—With stakeholders collaborating in new ways to care for patients, there will be a different distribution of risk, and incentive structures will need to ensure that all stakeholders are working for the same ends. Obstacles include the lack of useful information on the health status of populations in local areas and the difficulty of assigning diseases which have a number of sequelae

Pros and cons of disease management for key stakeholders

Health system

Benefits:
- Better outcomes
- Introduction of best practices
- Outcome measurement
- Cost effectiveness
- Consistency of treatment
- Improved allocation of resources
- Improved systems overall
- Greater cooperation between the parts of the system
- Seamless care
- Less stressful for professionals involved

Disadvantages:
- May cost more
- Takes time and commits start up resources
- Upheaval while being introduced
- May be difficult to win over staff
- Difficult to change once established
- Could be a passing fashion
- Could introduce rigidities and block innovation

Clinicians

Benefits:
- Opportunity to work effectively and collaboratively
- Good, stable relationships with others
- Good access to information
- Increased professionalism

Disadvantages:
- Threat to clinical freedom
- Reduction in status
- Under closer managerial supervision
- Conflict of interest between demands of patient and protocol
- Changes the dynamics of doctor-patient relationship and the trust underpinning it

Patients

Benefits:
- Better outcomes
- More informed patients
- Greater involvement
- Continuity and consistency of care
- NHS more patient centred
- Preventive treatment
- May speed up treatment
- Guidelines are patient driven

Disadvantages:
- Restriction of treatment
- May perceive some treatment to be unnecessary
- Increased responsibility and decisions which they would rather not shoulder

and comorbidities into specific patient pools (eg diabetes, asthma) and of calculating the expected risk and financial liability.

There are two further critical elements of a disease management approach. It demands a long term perspective, but results are focused on short term gains and improvement—and although there should be a focus on values rather than cost, the danger is that in practice this will be reversed. Cost data are more reliable than data on quality, and most information systems are designed around financial rather than clinical outcomes. However, the price for focusing on costs will be to alienate the essential support from clinicians, who are likely to be motivated by quality improvement and service development rather than cost control.

A diagnosis of diabetes mellitus

Jane, aged 12 years, presents to her general practitioner with polyuria, polydipsia, and weight loss. The doctor makes a rapid diagnosis of diabetes mellitus and refers her to the diabetes centre in line with locally agreed guidelines. The next day Jane attends the diabetic centre with her mother. The consultant diabetologist recommends an insulin regimen and introduces Jane to the diabetic specialist nurse, who teaches her how to inject herself using a pen device and how to monitor her blood glucose. Jane is introduced to the diabetes dietician and watches a video on diabetes supplied by a pharmaceutical company, which is accompanied by a helpful information pack on compliance with treatment. The diabetic team discuss the symptoms and management of diabetes with Jane, and targets for her self care are developed. She is given her patient held record as well as patient information packs, including patient guidelines appropriate to her age.

Over the next two weeks the diabetes nurse visits Jane at home to monitor Jane's progress and contacts the practice nurse, who helps administer the monthly diabetic clinic at the practice's surgery. Jane's school is contacted to reassure the teachers that Jane can take part in all normal activities and to provide them with information about diabetes. The primary and secondary care teams are in close contact.

Pros and cons of disease management

The three main stakeholder groups in a disease management approach are the health system, clinicians, and patients. In the survey mentioned earlier, respondents listed what they thought were the benefits and disadvantages for each of these groups (see box). Over and above the perceived disadvantages, there seem to be three principal barriers to its introduction: a lack of clarity about how disease management will tie in with NHS structures, in particular the separate budgets in primary and secondary care and social care; possible professional resistance to change; and an absence of clinical information systems.

Unless the tie-in with NHS structures is sorted out, there is a danger of establishing initiatives that counter the values and strategic aims of the NHS. The present structural and budgetary divisions are likely to lead to a lack of incentives for integrated and seamless care and for scrutinising the quality of clinical care provided. Moreover, unless rigorous evaluation is built in from the outset there is the risk of failure to learn from the experiences of others.

The litmus test for a successful disease management programme will be the extent to which the patient's interests are given primacy and then met. But there remains an issue over whether the focus is, or

should be, on individual patients or whole populations of patients. Another concern is the doctor-patient relationship. Many fear that disease management might constrain the freedom of choice.

Professional resistance to change may be overcome only if doctors themselves drive, or feel as if they are driving, disease management.[8] Clinicians need to be convinced that the disease management approach will heighten their professionalism because it entails adopting best practice.

Within the NHS, disease management comes up against the classic demarcation between primary and secondary care. But diseases span all these services and are no respecters of boundaries. Given the focus on a primary care-led NHS, it is worth asking the question as to whether primary care is capable of taking on the extra load of disease management.

An integrated healthcare system will require long term alliances to be established between primary and secondary care which will, in turn, require improved information, information sharing, and collaborative working. None of this will occur quickly and all the changes will have implications for training and development. It will also be a key challenge for managers to avoid unacceptable variations across the country and to try and ensure reasonably consistent and equitable progress.

The government's approach

The NHS Executive's 1994 guidance on disease management was negative about the prospect of the NHS doing deals with the private sector, especially the pharmaceutical industry. [9] But the revised guidance which was to have been issued some months ago but got delayed by the election, will take a slightly more liberal approach.[10] The discussion paper which preceded the final guidance focused on the area which has generated most political concern, namely, the desire for joint disease management ventures between the NHS and private sector companies. According to this document, the government "neither encourages nor discourages such ventures."

In its guidance, the government is concerned to respond to the interest which has been generated by overtures to the NHS from the private sector and sets out some safeguards to help the NHS to assess individual proposals for joint management before deciding whether to enter into them. A possible framework is provided to help NHS purchasers assess locally the merits and risks of individual schemes and help them to decide whether to enter into disease management agreements.

Conclusion

Disease management will improve the delivery of care if its limitations are honestly acknowledged and it has the full support of clinicians and others to drive quality and improve outcomes. It represents good practice and common sense in the provision of effective care—but it will only be as successful as the robustness of its evidence base and the calibre of its managers. It is not a panacea. But the inherent reasonableness and common sense of the approach, and the growing frustration with a health system that is becoming more fragmented and compartmentalised, points to an enhanced role for disease oriented approaches in future.

A pregnancy test is positive

Jane adjusts well; she seems well motivated and is seen at the surgery once a month by the practice nurse and at three monthly intervals at the diabetic centre. Once a year she has a full assessment, including funduscopy, and also sees a chiropodist. Everything seems to be going well until, four years after diagnosis, the primary care information systems pick up that Jane (who is now 16) has missed an appointment. A further appointment is sent but also not attended. The practice nurse visits Jane at home and after discussion enlists the help of the clinical psychologist at the diabetic centre, who establishes a rapport with Jane to the benefit of her diabetic control.

Jane leaves home and moves in with her boyfriend. At her next clinic visit she is found to have microalbuminuria (confirmed on three occasions). Despite her normal blood pressure she is about to be given an angiotensin converting enzyme inhibitor, according to the protocol developed in conjunction with the renal team; then it transpires that she had stopped taking oral contraceptives three months previously due to a "pill scare." A pregnancy test is positive. She had received preconception advice six months earlier, as set out in the agreed guidelines, but at that time she had not been sexually active.

Mother and baby do well

Jane is happy to be pregnant. She attends the diabetic antenatal clinic where she sees the multidisciplinary team, which includes a diabetologist, obstetrician, midwife, diabetes specialist nurse, and dietician. Her diabetes control is good due largely to the home visits of the diabetic specialist nurse and the practice nurse, who Jane trusts. At 24 weeks a routine check discovers retinal changes and Jane is seen by the ophthalmology team. Her blood pressure becomes difficult to control and her baby fails to thrive. At 37 weeks the baby is delivered by caesarean section. Mother and baby do well and are discharged into a flat found for her through the intervention of the social worker.

Jane's diabetes continues to be monitored in agreement with shared care protocols. Over the long term, care is well coordinated by the primary care team. Jane is well informed and feels involved, in control, and an equal partner in her own care. All those involved in Jane's care feel happy that they are delivering a patient centred, cost effective service and that Jane is a success story. This is reflected in her biomedical, psychological, and social outcomes. The overall local population outcomes and the health team's performance indicators are also satisfactory. It is, however, acknowledged that while Jane is a success story the disease management approach cannot be guaranteed effective for every individual.

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