



Exploring the World of
**Interactive medicine and personal
healthcare management**

Tuesday 12 June 2001

Commonwealth Club, London

CEST FOR LIFE SCIENCES PROGRAMME

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ATTENDEES

Organisation

Amedis Pharmaceuticals Ltd

Axis Shield

CHIME @ University College
London

City University

Department of Health

LGC

Marconi plc

Nycomed Amersham

Royal College of GPs

Royal Pharmaceutical Society

Swiss Re

Unipath

CEST

16 Participants

Key points emerging from the discussion dinner

- iMed is an evolutionary, interactive form of patient-centred medicine that uses biotechnology (predictive, diagnostic and prognostic tests) to produce evidence and information and communication technologies to move the information about, interrogate it and allow it to be shared.
- Healthcare delivery lags developments in medical science.
- Lean thinking approaches may improve the quality and efficiency of healthcare delivery.
- Bottlenecks in the healthcare delivery process can be overcome using information and communications technologies. Ready access to information and decision support tools is required, and sufficient bandwidth to let the information flow.
- Adopting a process management approach aligns thinking among provider and user communities and could deliver substantial savings.
- Who will pay for "point-of-care" tests? Evidence based tests require to be reimbursed. Otherwise doctors will not use them.
- How can the iMed vision be delivered? How can the benefits, savings and costs be shared between primary and secondary care?
- We shouldn't underestimate the importance of GPs as gatekeepers.
- The clearest focus for a collaborative initiative is exploring how point-of-care testing can be integrated into healthcare delivery, through alignment of strategies in the different communities.

A synopsis of the meeting follows in 4 sections:

- 1. Introduction and welcome**
- 2. Information and patient flows in healthcare delivery**
- 3. Conclusions of CEST's iMed consultation**
- 4. Discussion**

1. Introduction and Welcome

Diana Bradford welcomed participants and gave a short description of CEST. We are a not-for-profit organisation. Our mission is to accelerate the positive impact of science and technology, acting as an independent hub to support innovation that benefits industry and society. We do this by facilitating collaborative groups that allow participants to explore issues by sharing perspectives, enhancing practices and informing policy, both within companies and across government.

The participants were reminded that the meeting would operate under the Chatham House Rule (namely that all contributions other than the presentations would be unattributable outside the meeting). Attendees then gave brief introductions to their interests which included: new product development in the iMed area; the development of analytical and reference services; how GPs will integrate the new technologies; how such technologies can improve patient measurement and medical decision making; the impact on prescribing practice and the transfer of information from doctor to patient and pharmacist; point-of-consultation diagnostics; and the connectivity of health information.

2. Information and patient flows in healthcare delivery - *Terry Young (Marconi)*

Who is Terry Young?

As Marconi's Business Development Director, Medical Systems, Terry Young's aim is to understand how best to exploit communication and medical technologies in healthcare. This means exploring the linkage between information flows and patient flows and relating this to the infrastructure and applications needed to create appropriate information flows. Terry received both his BSc in Electronic Engineering and Physics, and his PhD, for a thesis on laser spectroscopy, from the University of Birmingham, UK. He spent 13 years in industrial R&D, numerically modelling opto-electronic devices, working on photonic systems and eventually running a small multidisciplinary research division. Born in Maine, Terry grew up in the Middle East and then in the UK when the family settled in the Midlands. He is married with three sons.

Abstract: Information and patient flows in healthcare delivery

Since the science of healthcare (in terms of diagnosis and treatment) has raced well ahead of the logistics of healthcare (in terms of delivery to the masses) there is a process level at which the healthcare and industrial communities may beneficially engage.

Industry has developed process models over the past 30 years that have boosted quality, slashed costs and shortened manufacturing cycles. These models emphasise end-to-end product flow rather than process efficiency or throughput, and to that extent the benefits that have been achieved are somewhat counterintuitive. Significantly for medicine, queuing is reduced or eliminated.

If these models (which resonate strongly with such trends as patient-centred care and integrated care pathways) apply in any way to healthcare, there is significant scope for more uniform and effective delivery, under less stress by a more responsive system, without cost escalation.

Finally, such models point to a clear role for communications and information infrastructure and a way of assessing the value of these elements to healthcare delivery.

Delivery lags Science

Terry opened by pointing out that although the science of healthcare has rapidly advanced over the last century the logistics/delivery have been slower to evolve. He went on to describe how healthcare delivery today often follows a batch and queue paradigm where we spend most of our time waiting and we make multiple visits to get the right skills mix (for example we take tests at a hospital and not at the GP's surgery). The throughput and efficiency at each step is very high but overall the end-to-end pathway is inefficient, slow and laborious. This realisation triggers the thought that the lean thinking approaches adopted in manufacturing processes might have something to offer in healthcare delivery. For example lean thinking methods:

- Specify value by product
- Identify the value stream
- "Make the product flow at the pull of the customer (build to order not forecast) in search of perfection (not competition)"

As practised in the car industry this leads to dramatic increases in quality and reductions in costs (50%!) and time to market. Additionally the approach is very scaleable and this is of particular interest when contemplating healthcare where processes exist at many different volume levels.

In order to adopt a lean thinking approach one must first identify where in the end-to-end process there are bottlenecks or constraints. As processes become more complex, and because of interdependencies, the number of constraints tends to one. Once this primary bottleneck has been identified it should be focussed on and minimised. For example you might want to increase capacity at that point, stop sending unnecessary work through that point, always keep that point supplied with work, synchronise upstream steps to the constraint etc. This will expose a constraint elsewhere which you then focus on and so on. In healthcare delivery the most important bottleneck may be radiology where apparently many departments wait around for patients.

If a multiple encounter healthcare delivery process is re-examined using ideas from lean thinking, patient delay and travel should be minimised. This can be achieved by a GP:

- Using information tools to prepare ahead of the consultation (internet awareness tools, decision support, presubmitted info from patient)
- Booking a specialist from anywhere for virtual consultation and bringing in skills from local PCT, other local amenities.
- Having tests available in surgery for patient to take.

By these means the patient can get a faster (maybe on-the-spot) diagnosis. Costing of this new approach is hard since end-to-end costs are rarely captured but initial studies show 50% cost reductions. However as with other examples of removing a bottleneck this will expose bottlenecks elsewhere and may lead to increased demand overall.

Thinking about healthcare delivery in these process-engineering terms has two main advantages:

- It provides a way for healthcare providers and suppliers to engage and explore where these ideas can appropriately be applied
- It provides a common framework for technology assessment. For example in pharmaceuticals where the bottleneck metaphor is more common such technology assessment is more advanced.

When we examine healthcare delivery as a process in this way we can see three major bottlenecks/sources of delay that can be alleviated with appropriate technologies:

- Delays due to patient ignorance could be addressed using internet information provision
- Delays due to primary care ignorance could be lessened with decision support packages
- Hospital delays could be reduced by using information tools to flow patients through the system better

Multiple consultations as one progresses through a series of appointments for sequential tests could be obviated if common records and understanding could be gathered together (virtually) to allow a distributed group of specialists to make a joint clinical decision.

So what is stopping immediate adoption of this lean thinking paradigm?

The model presupposes that practitioners have ready access to information and decision support tools and that the information can be shared among specialists, and where they want it, patients. There needs to be sufficient bandwidth to allow the information to flow. Teleconferencing and virtual viewing of radiological pictures need high bandwidth and in general it will be easier to introduce e-medicine if the applications work immediately when the doctor points and clicks rather than "chuntering away". Ease of use and ease of access will drive rapid uptake. If all specialists have access with sufficient bandwidth then joint decision making on the basis of shared information can become routine even where the team members are geographically distributed.

There also need to be solutions to the data-warehousing problem: where is all the information to be stored? Terry argued that it need not be at a hospital or other health provider site. Perhaps there are advantages to having the information held at a server farm far from the overstretched IT departments of health providers. From such a remote centre wideband networks can distribute information and potentially applications to the clinical decision makers in their clinics and hospitals. Coupled with the data warehouses and speedy external networks there will be a need for capacious internal networks. This is not telemedicine but a new view of medicine. For example this would allow more efficient management of a radiology resource since it would allow distribution and sharing of tasks. In general it ought to be possible to remove much of the "batch and queue". It is possible! Maternity is less easily scheduled!

In general then better healthcare needs better processes. Adopting a process management approach aligns thinking among different communities and looks like it could deliver substantial savings. There are also considerable patient benefits of having a primary care led, patient driven process rather than a consultant driven approach. However there will be considerable resistance to change and this will only be overcome if the tools aid clinicians as well as patients. The tools will need to improve access

to information, guidelines, clinical records for doctors and their patients and will require to be robust and easy to use. Technology push must not overcome patient pull!

As it is highly unlikely that such technology/ systems can be implemented in one go, it has to be asked whether the goal can still be reached in a step by step process. The answer is probably yes - but it is fair to say that some of the value would be lost doing it that way.

Overall the benefits to healthcare administrators include better, more uniform healthcare delivery, less waiting, better audit and management. Clinicians will benefit by feeling renewed ability to help patients, experience less bureaucracy and more control of change, and gain the ability to specialise from locations remote to demand.

3. Conclusions of CEST's iMed consultation

What is iMed? Why embrace it?

Alastair Philp opened by reminding participants that this project had grown from one of the strands of the New Genetics programme that CEST ran last year (for a summary of the programme conclusions see <http://www.cest.org.uk/newgenetics/ngsummary.pdf>). Alastair continued by explaining that CEST's view of iMed is of a evolutionary, interactive form of patient-centred medicine that uses biotechnology (predictive, diagnostic and prognostic tests) to produce evidence, and the sorts of information and communication technologies Terry described to move the information about, interrogate it and allow it to be shared.

Multiple stakeholders benefit from iMed. Patients will get swifter, more individualised healthcare. Healthcare workers and funders will save time and money and be able to provide superior care. And there will be many opportunities for vendors of tests and the communication and information processing applications.

Challenges of iMed

Over the last few months CEST has been consulting among many of the groups who will be impacted by the adoption of an iMed paradigm, with a view to understanding how the vision can be realised. During our consultation we have developed a sense of where the most truculent problems will arise and it is these that we presented for discussion.

A/ Predictive medicine The predictive value of biochemical and genetic tests will vary depending on the test and some may need to be frequently repeated. While this is not an issue with a 50p-a-go blood glucose test it may be a major cash drain if the test requires specialist interpretation. Another issue is who will do the testing? Will it be allowable for supermarkets to sell the test? Will tests be done in the GPs surgery (the at point-of-care option) or at the pharmacist's shop? Who will pay? Will it be the patient? A drug company who wish you to be screened (pharmacogenetics) to see if you're suitable to take their drug? Your PCT? Will monitored lifestyles be an alternative to drugs? Will such monitoring be paid for by primary or secondary care budgets?

B/ Electronic healthcare What are the technology constraints of current systems? How can compatibility be ensured? At present there is a patchwork of applications in the NHS. The

appearance of open system standards at first sight seems a positive development but how can commercial organisations be encouraged to write open system applications that they won't then be able to fully realise the value of? How can the quality of internet information accessible to patients be maintained/validated? Who should hold the electronic health record? Should it be the patient, on a smart card, or the GP? Or should both patient and GP have a smartcard key? How can access be restricted to only those authorised by the patient? Should the patient have that control? How should such electronic health records (EHR) be structured? Should they have freeform fields or only use a structured, standardised vocabulary?

C/ Strategy for Delivery How can the partnerships between suppliers and among users at different levels of the healthcare delivery process be enabled? How can the utility of process methods such as "lean thinking" be demonstrated? What are the key points to garnering clinician and political support? How can we avoid merely following technologies looking for problems and instead frame problems that we can then deploy appropriate technologies to address? What types of training will be most appropriate?

D/ Financial Planning Even where overall savings can be made by following iMed type approaches, how can the savings to secondary care be redistributed to primary care, where additional resources will be required? "The money following the patient" is an admirable slogan but how can it be made to work? There will also be other new situations. For example which budget will home monitoring come from? It will save bed costs to secondary care - should they pay? Or will it be considered primary care, even if the specialist doing the monitoring is part of the secondary care team? The most pressing issue it seems is how to find money today in order to generate savings tomorrow. Maybe increased efficiency and expenditure today won't give overall savings tomorrow anyway, since as individual procedures become more efficient the slack will be taken up elsewhere. Is demand for healthcare saturatable?

E/ Psychology of iMed Introduction of these new technologies and processes will require behavioural change within the health care professions. Acceptance is likely to require benefits to be demonstrated to them as well as for patients. In a cash-poor organisation with a high turnover of staff and initiatives, and which often seems to be in crisis management mode, will there be support for this sort of grand plan? There will also be great potential impact on the doctor-patient relationship. Some patients will like the idea of the patient-centred and enabled virtual healthcare team. Others just want their Doc to tell them what to do. There is also a potential for people to feel that in a system where evidence-gathering and technology are centred around particular symptoms, that they are not being treated as holistic individuals and merely as unique conjunctions of symptoms. There will also be circumstances where virtual consultations are inappropriate and sensitive introduction of virtual care procedures, even where they are appropriate, will be required. There will still be an important role for face-to-face dialogue with the friendly local family doctor to gain reassurance in times of stress as important life-changing information is exchanged.

4. Discussion

Gatekeepers

- We shouldn't underestimate the importance of the GP as gatekeeper. Primary care is quite efficient. Of ten people who are seen, only one needs to go to hospital (needs to go quickly). The other nine don't need this level of care and in fact it would be dangerous for them to get caught up in the whole healthcare machine. That said the appearance of evidence and the use of decision support software to evaluate the evidence can only make the GPs job as a gatekeeper more successful.
- GPs make uncertainty acceptable and may address issues of loss of holistic perspective. They certainly provide continuity: on average people spend 17 years with the same GP practice. GPs may not have time to read presubmitted information before seeing patients. We have to think about what we don't want to lose from the present system: "don't throw baby out with bathwater etc.) We should acknowledge the tension between public health policy and the interests of individual patients.
- Only 28% of public have internet access. Clinician uptake of IT is also somewhat variable. For example among those with the Prodigy prescription support software only 7% use it. Systems have to be clinician friendly if they are going to be used.

Cultural Change

- To overcome cultural change, adoption of new processes and technology must be led by the clinical community. Teleconsultations have not become integrated. The technology needs to be appropriate and accessible to practitioner workflow (transcription of information from paper to electronic records is currently a major obstacle). Acceptance of technology is also a sticking point.
- There is a recognition that there is a need to move away from paternalism and towards consumerism. However increased patient expectations require to be managed. There is a great need for continued professional development to cope with this and expectations of technologists!

Access and compatibility

- Are smart keys or cards the answer to demands for secure yet easy access? The desired function is to allow access 1/ for patients, 2/ for doctors. Data doesn't need to be centralised. Patient records need integration of information from disparate sources. How can we ensure confidentiality? Who should see records? Scalability of secure systems may be less straightforward. Should the patient be the primary data controller? These questions raise issues of autonomy and patient respect. Essentially the problem of selective access requires two steps: setting policy, then technological delivery of this. Data access, consent gathering and security are unlikely to be topics that CEST can contribute much to. Other dialogues are already running.
 - What is the best way of capturing test data on open systems? Common data standards for use are required. GP's nightmare is that internet tests could diffuse. Structured recording of clinical histories will be required so that notes are meaningful to other clinicians, but this is not new.
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However the need for occupational coding and environmental coding as well as biochem proxy markers and genetic profiling is new.

Who pays

- Who pays? PCT?
- Evidence-based tests still require to be reimbursed, otherwise doctors will not use them. Examination of experience in Germany and Scandinavia may be revealing. Near-patient testing - experience in Germany shows that reimbursement is more important for technology uptake than available technology. How can costs be reimbursed? Should there be a charge to patient? Might this be more acceptable in the context of a one-stop-shop providing all aspects of preventative medicine? Might insurers be persuaded to carry this cost? Does predictive medicine require a different funding model from curative care?
- Telemedicine in general fails because of high capital and human costs that are not reimbursed.

Measuring

- How best can effectiveness be measured? What proxy measures might be appropriate?
- Comparisons with other industries are useful - what did they do? What worked and what didn't?

Uses

- e-triage and decision support software have most immediate clinician appeal. E-prescribing might also be popular.
- Non-genetic and non-DNA genetic tests have been done for a long time.
- What can be done differently in primary and secondary care?
- An increased volume of near patient testing including pharmacogenetics will generate integrated knowledge that needs to be reliable and retrievably captured. This will impact the process of medicine. In general chemistry is essentially there (biochem tests) but the IT infrastructure to use test results is not. There is a pressing need for an information environment into which test data and other evidence can be plugged, to support decision making.

Areas that a collaborative initiative might most profitably focus on

Perhaps the clearest focus is looking at point-of-care testing - aligning strategies in the different communities. Other aspects amenable to joint study are exploration of the cultural changes required to adopt the iMed paradigm and building awareness of the benefits to all of a process approach.

CLOSE

These minutes prepared 22 June 2001 by [Alastair Valentine Philp](#). Please contact Alastair with any comments or clarifications.
