Remote possibilities: how rapid telehealth advances are revolutionising patient care

Information and communication technologies (ICT) have been quietly revolutionising healthcare for some years now. Telehealth enables the patients themselves to manage their own chronic conditions using wireless, remote technologies in outpatient and community settings. Early fears about telehealth's reliability and privacy are subsiding, just as the economic case for its wider uptake is becoming more compelling. IBI analyst Ashley Yeo provides an overview of recent developments in this fast-changing environment, and where we are now

It's easy to make your mark on a blank canvas. Unfortunately, when it comes to healthcare provision, the picture is already very busy.

That is particularly true in the established economies. Integrating new ideas, technologies and methods into widespread use in mature healthcare systems can only occur after a change in thinking and a decommissioning of existing equipment. This necessarily slows the uptake of concepts like telehealth, the advantages of which have nevertheless been evident ever since the idea of remote wireless healthcare delivery first emerged.

Conversely, the emerging economies are more likely to have less complex systems of healthcare provision. But there is a different hurdle here: cost.

Whatever the geographic market, the progress towards an ICT-based, wireless future for vast sections of the population – for that is the course we are on – is hampered at present by lack of co-ordinated decision-making at a high level.

Indeed, the absence of national policy decisions on integrating telehealth solutions has resulted in healthcare product manufacturers and ICT providers driving the initiatives themselves.

To date, the transition to telehealth has been technology-led, spearheaded by a plethora of major electromedical healthcare technology concerns, integrated diagnostics and sensor technology developers, and ICT, mobile network and database providers. Apple, Bosch, Cisco, GE Healthcare, Google, Intel, Philips Healthcare, Microsoft, Orange, Siemens, Sorin, Vitaphone and Vodafone all feature on this list. Some use collaborations to boost their understanding and penetration of the market, while others may approach the market alone.

Why telehealth?

The rationale for telehealth is simple but compelling: people are living longer, and there is a higher incidence of chronic and long-term conditions (LTCs), which demands a higher share of the healthcare budget year on year.

The ratio of tax-payers to net welfare beneficiaries has worsened measurably, with fewer wage earners now paying for any given country's health and social costs. There is also the spectre in the future of fewer nursing staff being available to tend those needing chronic care.

Concerning patient outcomes, telehealth contributes to reduced morbidity and mortality, cut visits to GPs and reduce unnecessary hospital admissions.

Alongside the strong economic need for a change in approach in terms of healthcare delivery and how to pay for it, there is a growing bank of evidence to prove that a large proportion of patients are happy to have the greater control over their own health that telehealth systems afford. The evidence shows that this, too, contributes to better outcomes. Patients' compliance with medication regimes has been shown to increase. And being able to remain in their home environment has a strongly positive effect on wellness factors in a huge proportion of patients.

There is also the issue of social care provision, and this is where telehealth overlaps with healthcare occurs. As Bosch Healthcare pointed out at the spring 2010 UK launch of its Telehealth Plus system, not all hospital admissions are necessary.

But getting patient care in the community right could cut costs from both the social welfare and healthcare budgets, and this is what governments around the world currently have to confront.

What is telehealth?

"Telehealth" comprises systems and services that link patients with care providers to assist the diagnosis, monitoring and management of patients with LTCs, and granting the patients more control over their therapy.

A succinct definition is provided by COCIR, the European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry. It says that telehealth systems use devices such as interactive audio, visual and data communication, to remotely collect and send data to a monitoring station for interpretation and to support therapy management programmes, and to improve patients' knowledge and behaviour.

Telehealth systems can include any combination of:

- patient interfaces in hardware/software;
- sensors/peripherals;
- operating software and applications intended for care provider usage;
- clinical content and intelligence;
- data transmission, storage and intelligent routing;
- system operation;
- logistics; and
- financial services.

The data inputs are both subjective (such as patient self-assessments) and objective (such as the dedicated peripherals that measure vital parameters).

Telehealth's place in the health ICT lexicon

Part of the reason for the piecemeal adoption of telehealth at present is down to ignorance of what it comprises. The panoply of terms used to describe parts of the system, which often seem to overlap, does not help.

Broadly speaking, telemedicine is the umbrella term used to describe healthcare services delivered remotely via ICT systems. It is often used as a generic term to refer to patient-doctor consultations.

Beneath this, telehealth describes the doctor-patient interface, with a focus on clinical applications and education. Telemonitoring (of vital signs, for example) is part of telehealth, as is the more unobtrusive support known as ambient assisted living.

Two other elements come under telemedicine: remote doctor-doctor interface, necessary for such applications as inter-hospital teleradiology and telescreening; and telecare, which is more to do with social welfare than pure healthcare, and can also draw in elements of ambient assisted living.

But these terms are frequently misapplied and are, to many, largely interchangeable.

In addition, there is a raft of associated terms: ehealth, a catch-all term, and one that tends to describe infrastructure; and, similarly, healthcare IT, an older term that seems to refer more to inpatient applications such as EPR (the electronic patient record), a record held in a single institution, and EHR (electronic health record), a patient's lifetime cradle-to-grave record.

The market for telehealth

The size of the developing market remains unclear. Even now, 21 years after phone-based remote diagnosis and treatment systems for cardiac patients became a commercial reality in the US, it is to the subject of speculation.

What we do know is that, in the EU, it is currently a tiny fraction of the €1 trillion ($1.3 trillion) that the 27 member states spend on healthcare annually. The total healthcare spend in the EU is growing by 4% per year.

Of that total, an estimated €14.2bn was spent on ehealth in 2009, according to Ioannis Maghiros, head of section (techno-economic implications enabling societal change) at the Institute for Prospective Technological Studies of the European Commission's Joint Research Centre. Nearly

three-quarters of this ehealth spend goes on non-clinical systems, and just short of a quarter on clinical information systems. Of the remainder, 0.9% is spent on telecare and homecare, and, of that, only 0.6% goes on remote monitors and personal health systems.

These are small numbers. This is because there has been an absence of a clear "policy push", according to the EU official. But at the very least, the numbers show that telehealth has started to be recognised as having a vital future role.

The EU ehealth market of €14.2bn may account for only around 2% of total healthcare expenditure, but the consensus is that there is great promise for it to rise to €50bn in the near future.

Mapping out needs

The lack of clear strategies is down to ignorance of how much to expect from want these technologies, and their effect on established healthcare systems, parts of which will have to be decommissioned to make way for change.

The mapping out of market demands and how to address them remains patchy. Speaking at a Westminster Health Forum meeting in February 2010, a conference designed to provide an update on current uptake and future needs in the UK, Silicon Bridgewater Research managing director Murray Bywater said a comprehensive study on telehealth by an academic institution was needed.

Tunstall, the UK's leading provider of telecare devices, tends to agree. Speaking to *Clinica*, the company said that an industry report setting out the UK's telehealth needs and how to meet them would be very useful. Although Tunstall's core activity is telecare – a market also contested in the UK by Chubb and Tynetec, among others – it has an interest in telehealth, and considers that the industry would benefit from such a strategy document.

This is also the view of COCIR, which in February 2010 issued a position paper calling on EU health systems to accelerate efforts to deploy ICT-driven solutions, in view of projected funding and staffing shortfalls.

"For a better deployment and use of telehealth" (www.cocir.org/uploads/documents/58-963-cocir_position_paper_on_telemedicine_-_17_february_2010.pdf) stresses that integrated and preventive care is better and cheaper than emergency care. In addition, physicians and nurses need technologies to make increasingly high-quality healthcare affordable.

Given that legal instruments to maximise the deployment of telehealth solutions are not available in the EU yet, COCIR has recommended that the European Commission and member states should work towards establishing an appropriate legal framework, coupled with effective transposition at country level, as a matter of urgency.

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Matters are beginning to move more quickly, spurred by two things: budgets are ever-tighter, and cost-effective solutions are the top priority; and companies are moving closer to market readiness

It makes other recommendations to expedite uptake and clear the ground for telehealth. It says that:

- healthcare stakeholders need to co-operate more closely to develop best-practice health strategies that support the use of telehealth in routine clinical practice;
- large-scale, sustainable projects with health economic evaluations need to be set up and financed, to gauge the impact of telehealth, echoing Murray Bywater's call;
- telehealth needs to be integrated into existing care delivery structures with interoperability a paramount consideration; and
- economic models for telehealth need to be established.

Telehealth in the EU's Digital Agenda

But matters are beginning to move more quickly in this area, spurred by two things: budgets are ever-tighter, and cost-effective solutions are the top priority; and companies are moving closer and closer to market readiness, and are busy preparing the ground for their products.

In truth, the whole field of telehealth is now better understood by the authorities. By way of example, in June 2010, the European Commission made ehealth part of its new Digital Agenda, the EU flagship initiative which aims to build a sustainable digital society in Europe by 2020.

The Digital Agenda strategy specifically addresses ehealth and ICT as a way of facing societal challenges, and underlines how ehealth technologies can improve the quality of care, reduce medical costs and foster independent living.

It outlines pilot initiatives as well as promoting EU-wide standards, interoperability testing and certification of ehealth systems by 2015 through stakeholder dialogue. It also identifies conditions for successful deployment including the protection of personal data, the removal of legal barriers, interoperability and co-operation between member states.

Indeed, the industry believes that the use of teleheath systems will be key to maintaining patient records and enabling citizen mobility throughout Europe.

Among other EU telehealth initiatives are the EU-funded MyHeart research project, under which Philips and some 40 other partners from 11 countries are developing an advanced heart-failure management system to provide more comprehensive information about patients' conditions and enable earlier intervention. The system consists of a wearable textile vest with embedded sensors designed to assess the accumulation of fluid in the lungs – a potentially life-threatening condition for heart-failure patients.

The EU also funds the HeartCycle project, also headed by Philips, which explores patient-centric solutions based on innovative sensors for chronic disease management at home.

Elsewhere, the European Connected Health Campus spearheads the development of connected health markets and practice across Europe. The ECHCampus (www.echcampus.com) and the UK's Telecare Services Association work together at a strategic level to promote connected health initiatives. In November 2010, progress– in terms of both technology and implementation – will be summed up at a major UK event, the National Telecare and Telehealth Conference 2010 (Hilton London Metropole, 15-17 November (http://www.asap-uk.org/news/42255/48586/national_conference.htm) organised by the Telecare Services Association.

Learning on the job

While some of the answers are coming, many questions remain unanswered, such as who should take ownership of developing strategies for personal health systems. Is it the role of governments? Or is it all down to the private sector? Are

regional strategies the preferred route? Or is it all three? And what is the right level of adoption for telehealth? In the UK, for instance, should it be the Primary Care Trust (PCT) in terms of geographical reach, or Strategic Health Authority, notwithstanding that their futures look uncertain under the new UK government. Or should it be wider still, and indeed be cross-border?

In the absence of defined strategies, companies have been filling in the gaps in a bid to dictate the pace. They have found that accumulating trials data helps build a platform from which to convince buyers that telehealth concepts are the answer to the demographic and financial conundrum before them.

Telehealth strategies

Trials build confidence – Bosch Healthcare

Private German technology provider Bosch is probably better known for its automotive, sensor system, consumer and high-tech products than for healthcare, but over the last decade it has been running trials of its "Health Buddy" system for remote monitoring of patients with LTCs.

Over that time, the device has been used by 150,000 patients, and some 33,000 US patients are currently connected to Bosch devices.

In Europe, the system is known as Telehealth Plus. In second quarter of 2010, the company announced it was launching its first major independent project in the UK with Barnsley PCT, where 60,000 of the population live with chronic conditions.

Bosch regards the daily vital signs monitoring technology as meeting the key telehealth criteria: it helps patients live independently, giving greater quality of life (QoL), while also cutting the cost of providing healthcare.

The three-phase trial will first enrol 150 patients with congestive heart failure living at home. It will be extended to patients with chronic obstructive pulmonary disease (COPD) and diabetes, and the third phase will bring the trial population up to the target of 2,500 patients. The trial, the findings of which will be independently evaluated by Sheffield University, is another step towards greater understanding and wider adoption of telehealth systems.

Bosch is also gathering findings from its ongoing Dundalk (County Louth, Ireland trial), 40-patient trial of the Telehealth Plus system in congestive heart failure and diabetes patients who were recurrent users of A&E and hospital services.

These findings are helping to build the case for telehealth technologies, and the cumulative data are moving us ever-closer to tipping point.

Bosch's telehealth devices have been the subject of some 30 peer-reviewed studies, the key findings of which are a high compliance rate, a QoL improvement, reduction in mortality and morbidity, and cost reductions "across the board".

That fits well with national needs. For instance, with healthcare efficiency a cornerstone of the Obama administration in the US, technology will be a big part of the future plans of government and industry.

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The demographic changes that lie ahead provide a compelling reason for the greater and faster integration of remote technologies

The US Veterans' Administration (VA) and CMS last year published data based on trials of the Health Buddy showing that chronically ill patients treated with telehealth devices spend substantially less time in the hospital, and save the VA system money as a result.

The demographic changes that lie ahead provide a compelling reason for the greater and faster integration of remote technologies for chronic and other patients. For instance, the number of over-65s will have doubled within 50 years, and the incidence of chronic conditions continues to rise. The predicted shortage of nursing staff in the future also makes for a strong argument for telehealth.

Bosch's trials have also served to show that the technology is not for everyone, and there are issues yet to be resolved over who pays.

The reimbursement question – GE Healthcare

GE Healthcare, one of the trailblazers in the move towards telehealth and telecare, notes that, while decisions over reimbursement of remote technologies remain outstanding, the pace of uptake will remain slow.

On 2 August, the company definitively agreed to form a joint venture by merging its Home Health division with the Digital Health business of Intel. The computer chip

manufacturer is not new to healthcare-related R&D applications, having been in the field for some 10-12 years. It has built up significant strengths in ethnography – understanding the needs of the end-user – though studies in some 20 countries.

The joint venture is expected to be operational by the end of 2010 and will be owned and run jointly by both partners.

It builds on the existing GE-Intel healthcare alliance, which started when GE began selling Intel's Health Guide in the US in 2009, and later in the UK

The Intel Health Guide is an intuitive interface for remote patient monitoring. While not yet reimbursed, the guide is FDA-registered, and in Europe, pilots are ongoing at NHS Lothian, in Scotland, and NHS Central Lancashire. The latter, which started in June 2010 and will run for 12 months, has enrolled 40 patients with COPD. In later stages, the trial could be extended to patients with other chronic illnesses, such as diabetes, hypertension and heart failure

The Health Guide aims to meet the challenges of independent living and chronic disease management. It is a care management tool with a touch-screen user interface, which can be used by the patient to self-monitor for a range of vital signs, such as blood pressure, pulse and weight, under remote supervision by a nurse. Users can enter information and ask questions about their conditions. The inputs are reviewed on a daily basis. The device also incorporates a built-in camera, enabling the user to interface with a nurse during remote health consultations.

The system also lets patients watch videos on care management and enables physicians to remotely and accurately monitor conditions. It helps improve compliance, which is recognised as one of the major challenges in successful healthcare delivery GE says.

GE already has a bank of data from the US proving the utility of the device and showing its positive impact on many types of chronic disease.

The Guide will be just one of the products marketed and sold by the GE-Intel joint venture. The company will also be offering, among other things, GE's QuietCare system, which came with the acquisition of the Living Independently group. QuietCare is a remote sensing device that monitors elderly people in their homes and is targeted precisely at the independent living segment.

It assesses the daily pattern of elderly people – the time they wake up, number

of visits to the bathroom, etc – and sends alerts to monitoring staff if the system identifies abnormal routines that may signal infections, or detects falls. Passive in nature, it does not require the user to wear bracelets or pendants.

Together, the Health Guide and QuietCare offer broad management of chronic conditions and seniors living at home. While the Guide is a telehealth application, QuietCare fits more comfortably under the telecare definition.

It is a huge market, however, with GE Healthcare estimating that $19bn is spent on fall-related injuries in the US alone every year.

The group went deeper into the sector in spring 2010, when it became a partner in Ireland's TRIL (Technology Research for Independent Living) Centre. TRIL was set up in 2007 by Intel and IDA Ireland (the national Industrial Development Agency) to explore the physical, cognitive and social consequences of ageing and to design technologies to help address them. The greater uptake of such technologies will ease the strain on global healthcare systems as the population ages, says the IDA.

GE Healthcare is investing $3m in the centre, whose research focuses on enabling older people to live independently in their homes for as long as possible, giving them as much control over their lives as possible, with the aid of technology.

Empowering the individual – Philips Healthcare

Improved QoL and reduced hospital admissions among users of remote technology have much to do with the fact that the focus is on patients managing their own conditions. The ability for users to engage in a Q&A process regarding their condition via their device enables physicians and care staff to detect and analyse health changes, thereby potentially avoiding acute complications.

Granting individuals this kind of control has numerous benefits, and as Philips Healthcare has discovered, there are many pieces in the remote healthcare monitoring jigsaw, and not all of them are technology-centred.

US-based company Philips Lifeline provides a medical alerting system for elderly people who are connected by telephone to Lifeline staff 24/7. An example of an emergency service for individuals who are threatened with losing their independence, it is used by 750,000 elderly people in the US and Canada, and its call centres handle up to 40-45,000 calls per day.

Only 4% of those are emergencies, and 1% lead to a transfer to hospital.

Relying on phone and help-button communication, the service is not so much about the technology per se as understanding consumers' needs, and about monitoring patients after they have left hospital.

Lifeline staff can also interact with consumers in the vital area of medication compliance via unobtrusive monitoring equipment – either a wristwatch or a pendant.

Increasingly, the market is realising that telehealth/telecare is an extension to the healthcare system, and it is a way of making care more effective.

Philips' 2008 purchase of Respironics enabled it to launch its sophisticated sleep aid, the Philips Respironics Sleep Therapy System, for mild-to-severe obstructive sleep apnoea (OSA) patients, which helps providers recognise changing patient conditions that may require different treatment.

The system uses advanced event detection software and expanded reporting capabilities to recognise and report when a patient may be experiencing symptoms beyond OSA. These data are collected and transmitted to sleep physicians.

Philips shares the view that the challenge for healthcare systems around the globe is how to pay for the advanced products and services that telehealth and telecare are now providing ever faster, and with ever-increasing functionality.

But as the telehealth revolution becomes more embedded, the number of users will rise. At-home patients will become increasingly sophisticated in the healthcare that they are able to oversee themselves.

For Philips, the ever-evolving system of healthcare needs be rethought and rebranded as "Healthcare 2.0". The company has also devised a new approach to developing innovative care solutions for chronic patients by teaming up with Achmea Health, the Netherlands' largest healthcare insurer. The initiative focuses on enabling chronic disease sufferers to better manage their health at home, reducing the need for hospital stays.

Philips will use the insights of patients and healthcare professionals captured by Achmea Health to help shape and deliver remote monitoring and other technologies. This will mean that the inevitably fewer care professionals will be able to handle more patients, in less time and at a lower cost. But the standard of patient care will

not drop, as the patients themselves will be in the driving seat, managing their own health.

Advancing personalised healthcare – Siemens

If GE and Philips have tended to focus on telehealth and telecare, the third of the in vivo/imaging giants, Siemens Healthcare, appears to have dedicated more resources to inpatient ICT solutions. The Germany-based group has directed much of its attention since 2006 towards expanding its IVD presence, building diagnostic capabilities across-the-board.

But in late Q4 2010, it signed a licensing agreement which would see the Microsoft HealthVault introduced into the German market. HealthVault is a personal health application that allows individuals to store, update and manage their health information online as well as making it available for selected healthcare providers and family members.

Information from a variety of sources can be stored, including medical monitoring devices which provide readings for weight, blood pressure and heart rate; training plans from a physiotherapist or fitness instructor; and diagnostic findings. Data can be entered manually or via a connected PC using the HealthVault Connection Center.

Siemens is the exclusive operator of HealthVault in Germany, and will market the platform to developers, with a view to delivering personalised healthcare to the German public. The HealthVault was launched in 2007 in the US and Canada. Germany was the European launch country of the HealthVault technology, which Siemens says completes its ehealth portfolio.

Siemens's healthcare ICT programme is currently focused on clinical productivity, rapid access to information, continuous data flow and reliable clinical networks in the impatient setting.

However, its Soarian integrated health information system enables patients to self-monitor daily at home, where they can build up trends data that allow doctors to identify deterioration in patients at the outset. The advantage is in the software, which allows many thousands of patients to be monitored for, say, diabetes.

Unique patient advantages of telehealth

A telehealth study presented at the European Society of Cardiology's Heart Failure Congress 2010 in Berlin showed

for the first time that a telehealth system combining remote patient monitoring with motivational educational support tools can demonstrate significant additional value and effectiveness for managing the health of chronically ill heart failure patients.

Previous studies have analysed the advantages of telehealth in terms of patient care, decrease in hospital admissions and cost savings.

The CARME (CAtalan Remote Management Evaluation) study, which was conducted at the Spanish hospital Germans Trias i Pujol, monitored 92 patients with severe heart failure at home. Philips's interactive telehealth system Motiva was used to connect patients to their healthcare providers via their home television and a broadband internet connection. The Motiva is also being used in the UK's Whole System Demonstrator (WSD) site in Newham, London.

Results of the study showed: a decrease of 68% in heart failure-related hospitalisations; a 73% reduction in days spent in hospital; and continuous and significant improvement in patients' perceptions of QoL – from 62-72%.

Demonstrators and regional initiatives

The manufacturer-led telehealth push has gathered pace so quickly that it is no longer the distant "healthcare IT revolution" that it was painted as just a decade ago.

In fact, adoption of ICT-based healthcare delivery is no longer an option for national healthcare systems: it will come or, indeed, has already arrived. Soon, only close-knit regional healthcare outposts will be able to operate without telemedicine.

Device manufacturers know this, as do the lobby groups, such as the UK's Medilink West Midlands (medilinkWM), a regional hub representing device and healthcare product SMEs in the Birmingham and surrounding area. It is the UK's most densely populated region for medtech companies.

medilinkWM, led by Tony Davis, manages a demonstrator house in West Bromwich, and an apartment in north Staffordshire. They are among several demonstration sites around the UK and mainland Europe that showcase working examples of telehealth and telecare products. They are used to promote the systems specifically to health and social care commissioners. The idea is to provide the commissioners with hands-on experience of wireless technologies, to make the procurement path easier.

The strategy fits with people's preferences: a YouGov survey in June 2007 showed that only 1% of people wanted to live in a care home after retirement, while 87% wanted to continue to live at home. It also fits with the demographic trend, whereby chronic disease in the over-65s will have doubled by 2030, according to Department of Health (DH) estimates.

The West Bromwich house looks "normal" from the outside, but has been adapted for easy access. It features keyless entry, video intercom, wide paths and fingerprint readers, so carers can log entry and exit frequencies. All domestic appliances are connected to a fingerprint reader. A device called the i-Cue is the brain of the house, controlling heating, windows and entry systems. It monitors the activity in the house and provides voice message updates. Telehealth units for vital signs monitoring conditions are located in the dining room (see www.alvolution.co.uk).

While the response to the house and flat has been phenomenal, according to medilinkWM, the major challenge remains the person who controls the funding for such independence-promoting, life-enhancing products.

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Adoption of ICT-based healthcare delivery is no longer an option for national healthcare systems: it will come or, indeed, has already arrived

The UK government has been running WSD at three diverse sites since May 2007. The sites are: the county of Cornwall, the UK's least wealthy county with a dispersed population of 500,000; the inner London borough of Newham, a deprived borough of 270,000 ethnically diverse residents; and the county of Kent, with a population of 1.37 million people and urban and rural aspects, and where two supraregional telehealth pilots are already underway. Activities at these three sites are overseen by the WSD action network, a joint DH/King's Fund initiative. The demonstrator sites are due to report in April 2011, which could be a pivotal time in the development of telemedicine (see http://www.wsdactionnetwork.org.uk/news/from_the_dh_pilots_update/index.html).

Elsewhere, the University of Portsmouth

is working on a number of telehealth projects. Its faculty of technology has won a UK government grant to continue working on its smart homes initiative. Led by Dr Jim Briggs, who has 12 years' experience in telemedicine, the university team is studying ways to capture more information about the minutiae of how people live in order to help build new, advanced sensors in these smart homes. The university has a database of some 900 telehealth projects (see www.tkn.port.ac.uk).

Full-scale networks to meet national needs

Middle Eastern countries offer the rare opportunity where need for sophisticated healthcare delivery has come to a confluence with the ability to pay. Moreover, the healthcare infrastructure is still being built in this region.

German company Vitaphone has identified this convergence in the United Arab Emirates (UAE), where heart disease is the cause of 40% of deaths and the proportion of the population with high blood pressure is 36% – and rising. The incidence of coronary heart disease in the Middle East is expected to rise three-fold in the next 20 years.

Working with the German Heart Centre, the Mannheim-based company signed a deal in July 2010 to set up a telemedicine centre for the diagnosis, monitoring and tracking of therapy for coronary heart disease patients.

The telehealth network approach is widely thought to be a cost-effective and patient-centred success in a region where the traditional healthcare delivery model has failed. The UAE has a relatively small number of delivery points and patients have to travel great distances for medical care. But the telehealth solution, which includes round-the-clock monitoring at a dedicated Telemedicine Service Center, enables patients to stay at home while having their vital parameters – blood pressure, weight, blood sugar or heart rate – monitored. Deviations from the norm can be monitored closely, allowing for rapid intervention. The system has been well received, and has provided all the key deliverables: high regime compliance, better QoL and lower therapy costs.

Cisco Telepresence offers a similar service in Argentina, where, working with United Communications, it links paediatric patients with physicians who are hundreds of kilometres away. Argentina measures some 3,000 km north to south, and most of the country's medical centres are located

around Buenos Aires. The paediatric specialist hospital in the capital realised that 85% of consultations do not require travel, so it began using a video conference system by way of an experiment. This way of operating soon became routine practice when it was realised that the combination of a written diagnosis and video follow-up provided a richer interaction with the patients, which in turn fostered greater confidence.

Self-management of data – where Google and Microsoft fit in

Google and Microsoft have been monitoring the ehealth market to assess the potential for their technologies for some years. Results of this research began to emerge three years ago.

Their idea is that better internet searching, combined with heightened knowledge of healthcare and greater interest on the part of the patients will fuel a move towards increasing personal control of healthcare records. Microsoft's HealthVault personal health application platform is now available in Europe as well as the US.

Google Health is a way to store and manage all health information in one place, allowing people to track their own medical records and cross-check for potential interactions between drugs, allergies and conditions.

Phone-based telehealth

The push towards telehealth momentarily threatened to make other forms of communication, including the humble telephone, obsolete. In fact, the opposite has occurred: mobile technology is taking healthcare delivery to new heights. Even landline-based delivery, such as NHS Direct (7.5 million calls per year), has become both more professional and better used as attitudes to telehealth/telecare have become more favourable. This is a natural corollary of the educational effect of the internet and the growing movement towards patients taking a greater role in their own health.

NHS Direct took 51.7 million calls over swine flu in mid-2009, and referred 120,000 people to GPs. The aim is eventually to extend the service to other equipment: mobiles, Nintendo DS games machines and PCs, for instance.

According to Sally-Anne Pygall, director of Telephone Consultation Services (http://www.telephoneconsultationservices.co.uk), 25% of consultations now take place over the telephone, and 50% of calls result in

advice being given. "Telephone triaging is on the increase in most practices," Ms Pygall told the Westminster Health Forum.

One recent example of the realisation of the telephone's key role in healthcare is the Birmingham OwnHealth (www.birminghamownhealth.co.uk) scheme, a service that provides members who have LTCs (such as diabetes, COPD, chronic kidney disease, stroke, high blood pressure, heart failure and coronary heart disease) access to a qualified care manager over the telephone. The programme, run jointly by NHS Birmingham East and North, Pfizer Health Solutions and NHS Direct, appoints a care manager to help members to take control of their own health, make positive changes to their lifestyles and manage their conditions better from the comfort of their own homes.

There are approximately 1,500 different apps within the medical section of the Apple app store alone

At the leading edge of phone technologies are mobile applications for healthcare, which have moved from the unknown to something every major provider needs to be part of, according to medilinkWM. What is still not clearly defined or agreed is whether mobile applications truly have a place in healthcare.

The general consensus is that companies like Vodafone and O2 do have a role, given that their activities are now focused not on entry strategies, but competitor monitoring and the security, ethical and privacy issues of storing, sending and receiving patient data by mobile phone. They also play a key role in developing healthcare applications (apps). It is estimated that 4.5 billion mobile phone apps will be downloaded worldwide this year, and there are approximately 1,500 different apps within the medical section of the Apple app store alone.

Use of devices such as the Apple iPhone can save time and increase productivity in the inpatient sector. Physicians no longer have to rely solely on patient charts or hospital computers to access information; instead, they can use an iPhone to retrieve the data wherever they are, thereby improving their workflow.

Other companies are taking a more collaborative approach, as seen, for example, in Orange Business Services'

partnership with Italian company Sorin to develop a remote monitoring solution for patients implanted with heart pacing devices. The concept also includes follow-up care via electronic transmission of data from the device to the patient's physician.

Orange's rationale is that current models of care delivery are not sustainable, based on the change in life expectancy – with more than half the UK population currently aged over 47 years – and the incidence of chronic disease rising. There needs to be a move away from the beds-and-buildings model, says Sorin. In France, the company uses a "button, device, tariff/network" system, and intends to move that into other markets.

ehealth technologies for the inpatient sector

The evolving wireless healthcare industry also embraces technology used by ward staff and clinicians who need to report on their inpatients. Time- and cost-saving systems that do not fall under the banner of "telehealth", yet use the same concepts and technologies, are also hitting the market.

Siemens is a major player in this space, with its Soarian integrated care system, a web-based ehealth product for the communication of patient-related data, forms and documents among connected partners using a secure connection. This sector also includes mobile and portable devices, such as Panasonic's convertible business notebook, the Toughbook, which can be used as a tablet or in the traditional clamshell form. It is ideal for mobile workers like healthcare staff who need to enter data whilst on the move, and features a digitiser and multi-touch screen that can be used even with gloves.

Also included under this category is the new generation of digital dictation software, such as Winscribe, which is built on Microsoft architecture and can be used with a BlackBerry, iPhone or Windows Mobile; and Dictate IT. Winscribe bills itself as a one-stop source of medical transcription, digital dictation and speech recognition services for NHS Trusts, GP practices and private medical groups. Its intelligent workflow capability ensures that digitally-dictated messages are sorted by job type – A&E, oncology, X-ray etc – and the system can match the task with the person or team best placed to do the job. This reduces turnaround times.

Cerner and IMDSoft (Israel) and Philips Healthcare are also among those pushing

e-concepts within the hospital, with the aim of allowing hospital managers to provide quality care as demand increases and the impending nurse and doctor shortage threatens to become more acute.

Philips, through its critical care solutions provider, Philips Visicu, has been introducing its eICU remote patient monitoring concept into US ICUs for around a decade. It followed this in 2009 with the next step, eHospital.

Although reducing the staff headcount in the wards is not a primary goal of ehealth, hospitals will nevertheless benefit from higher productivity – a vital consideration given the likely shortage of nursing staff; by 2020, the US will be short of one million nurses, according to the US Health and Human Services (HHS) department.

Benefits of telehealth

The accelerating uptake of remote patient monitoring and self-therapy is due to the benefits it provides. COCIR says the advantages are immediate, tangible and significant, and are felt by patients, clinical staff and society as a whole. For example:

- telehealth patients live longer than people receiving usual care;
- acute resources are spared, hospitalisations are reduced (by up to 50%) as are inpatient stay lengths (by up to 48%);
- patients' QoL is enhanced;
- patients are more knowledgeable about their own condition, cutting clinician time and inputs on a regular basis;
- patients feel more empowered to manage their condition;
- when inputs are needs, they are more targeted and time-efficient; and
- records of heath needs and habit-based routines are built over time, providing a valuable research tool.

In spite of these benefits, obstacles to wider adoption remain. The main problems concern lack of reimbursement and fears over the interoperability of systems manufactured by rival firms. Building and encouraging interoperability is the mission of the Continua Health Alliance, an open industry coalition on personal telehealth (see www.continuaalliance.org).

The lack of legal clarity is another roadblock, especially as regards liability and registration of telehealth services and individuals. Furthermore, cross-border provision of telehealth services requires legal clarification as to privacy.

Economic imperative

Nevertheless, we are firmly on course for a future in which telehealth is an established and accepted part everyday life. Indeed, the economics of handing LTCs make it vital.

Bosch UK head Peter Fouquet notes that the UK alone has 15.5 million people with long-term conditions (LTCs), and because of this, new ways of helping the NHS achieve its objectives are required.

The cost savings generated by shifting more care away from the inpatient sector and into the community could amount to £50bn in the UK by 2015, according to the CBI's "Best of health – improving lives through smarter care" report, issued in February 2010 (see http://publicservices. cbi.org.uk/uploaded/Best_of_health.pdf). Telehealth has to be part of that move, given the NHS's stated need to save at least £20bn by 2014. The UK is considered by some to lead Europe in telehealth planning, but it is not alone in identifying the future needs.

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Pent-up demand waiting for an infrastructure

An explosion in the market for telehealth products and services is expected, but, as Silicon Bridge Research's Murray Bywater says, it has not yet happened because the infrastructure is missing.

While it is difficult to measure, expenditure on healthcare ICT in Europe alone is expected to reach €50bn per annum in the mid-term, of which ehealth will account for around one third, ie in the €12-25bn bracket.

Given the fast pace of technological change, the demographics, the economic need for chronic and LTC patients to be more involved in their own care (and the compliance benefits that this brings) and the shift from acute to community care, telehealth will be a feature very soon.

The key to the next stage in the development of this industry is interoperability. There is a view that, while national strategies have not been

forthcoming and infrastructures not built, the onus has fallen onto local and regional players to get together and solve this problem. They don't need to be 100% perfect to start with, according to Mr Bywater, but they do have to start. The early experiences of UK PCTs – threatened with abolition in the UK health ministry's 12 July White Paper – show the benefits: one third of PCTs are using telehealth, leading to a 75% reduction in unplanned admissions to hospitals.

History beckons

We need to question if we are making the required level of progress towards telehealth adoption goals. Some say that broad-scale adoption of fully ICT-enabled healthcare, including the essential – albeit troubled – electronic health record, is as much as 20 – even 50 – years away.

That is surely too pessimistic an outlook.

Indeed, our telehealth future seems to be arriving more quickly with every passing month, especially now that there is widespread understanding that telemedicine is designed to underpin care planning, not take it over.

As Dr David Colin-Thomé, the UK Department of Health's national director for primary care, said at a meeting in Whitehall, London, on 20 July 2010: "The technology is a vehicle for change. As such, it is part of the bigger deal. It is also essential."

Perhaps we will know that the technology has fully arrived the day we no longer routinely append the prefixes "tele-" and "e-" to products in this fast-growing sector.

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