A FROST & SULLIVAN EXECUTIVE SUMMARY

The Hand-Held Tablet: The Doctor of the Future? Transforming Health and Care Through Telehealth

in Collaboration with:

FROST & SULLIVAN

SCOTTISH DEVELOPMENT INTERNATIONAL

Scottish Centre for Telehealth & Telecare

NHS 24

THE UNIVERSITY of EDINBURGH informatics

View the onDemand version of the eBroadcast: **www.frost.com/health**

Critical Drivers of Telehealth

Three critical overlapping factors can be seen in the definition of telehealth. These factors include:

Home Health:
Remote monitoring, disease management, wellness systems, activity monitoring, and medication adherence.

Video Telehealth,
Telepresence; teleconsultation; visual collaboration; teleradiology; distance learning and simulation.

IT-Enabled Solutions,
eHealth; mHealth; personal health records (PHR); mobility added to current applications.

The convergence of a rapidly aging population with growing incidents of chronic disease has placed healthcare systems under pressure to create new solutions.

"Central to this future vision of healthcare is moving more emphasis to prevention and wellness and away from acute care where we are now," said Charlie Whelan, Director, Growth Consulting, Healthcare & Lifesciences, Frost & Sullivan. "If you currently look at our healthcare system across most of the developed world and most countries in the western world you're going to see a greater emphasis placed on acute care intervention. That's where the money is spent. That's where all of the technology is developed."

Four trends have been identified by Frost & Sullivan as the most important trends that are impacting the healthcare delivery landscape.

Increased collaboration amongst clinicians, care givers, patients, providers and other entities will lead to a greater emphasis on earlier diagnosis, better monitoring of health conditions, and more preventative care.

In addition to that there will be a **greater focus on tracking and documenting outcomes.** Today governments and healthcare providers are under greater pressure to demonstrate more evidence-based medicine. These entities are also operating in an environment that's under greater public scrutiny, which creates better transparency and ultimately delivers higher outcomes.

A demand for better financial management will be essential in an environment where there is less money available for healthcare. As demands for healthcare become greater, issues to address will include tighter cost constraints, declining reimbursement, and more expensive tools.

Better communications and content will lead healthcare to become more of an information-services industry than it has been in the past. This will lead to a greater demand for managing communications and content, including greater information flows to support training, the supply chain, and patient education.

Some of the greatest improvements and outcomes in terms of financial movement is in keeping people healthy longer when they're well. This involves managing people as they mitigate health risks; diagnosing and reducing treatment delays; moving to more interaction and self-management; managing healthcare; and making informed decisions.

One of the most effective ways of saving money in the healthcare system is to get to people before they are actually sick. "That's one of the best ways to improve long-term outcomes; that's one of the best ways to get the greatest financial return on investment for any healthcare system," said Whelan. "This is particularly true for chronic disease. If you can keep someone who has diabetes, chronic obstructive pulmonary disease (COPD), or heart disease out of the emergency room, if you can keep them under the care of a general practitioner—their primary care physician—as opposed to a specialist, you will see enormous outcomes in terms of cost savings and more likely in terms of improvement in clinical outcomes."

An important technology to support this shift is telehealth.

What Is Telehealth?

Telehealth is the delivery of healthcare services and information through telecommunications technologies. As the telecommunications industry has evolved—so has the telehealth industry.

Over the past 50 years telehealth has evolved from a doctor and a patient conversing over a telephone to IP-enabled healthcare data delivery. The current telehealth landscape is evolving due to the introduction of application-rich consumer devices, such as tablet computers, mobile phones, and personal computers.

"Telehealth has been demonstrated to save money and improve collaboration," said Whelan. Additionally, telehealth supports added communication and content, and it also can help to track and document outcomes. For these reasons, telehealth is an essential part of the shift toward early diagnosis and preventative care, as well as cost savings.

Having followed this market for decades, Frost & Sullivan has identified these key telehealth trends:

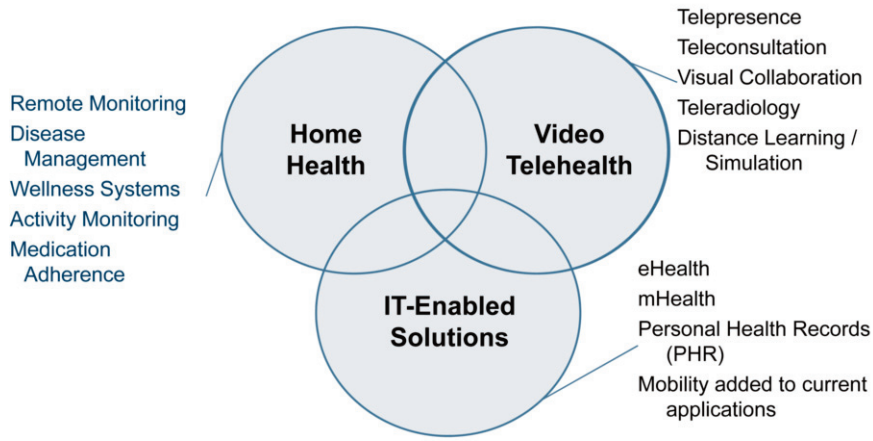
- Future solutions will be more focused on remote or wearable solutions that connect to the cloud through a unified patient

> Central to this future vision of healthcare is moving more emphasis to prevention and wellness and away from acute care where we are now.
> — Charlie Whelan
> Director, Growth Consulting, Healthcare & Lifesciences
> Frost & Sullivan

> The co-production model can maximize the benefits not only for health services but for patients.
> — Professor George Crooks, OBE MBChB MRCGP
> Medical Director
> NHS 24 and Director
> Scottish Centre for Telehealth & Telecare

> We have the capacity to generate huge volumes of data via monitoring.
> — Stuart Anderson
> Deputy Head and
> Director of Teaching
> The University of Edinburgh, School of Informatics

Various Parameters to the Definition of Telehealth



Home health, video health, and IT-enabled solutions are the three main sections of telehealth.

database—these sensors could be placed around the home, on clothing, or in automobiles.

- There will also be a rise in more sophisticated analytics that utilize a more holistic view of all patient parameters and drive care interactions.
- Software programs will drive analytics to deliver greater value to the healthcare system and drive decisions into the future.
- The telehealth market is more applications-driven through consumer devices like tablets, mobile devices, personal computers, televisions, and devices yet to be imagined.
- Telehealth will also become less clinical and more focused on patients' well-being, which will help to introduce new partners into the field, including telecommunications companies, entertainment companies, and security companies.
- Telehealth solutions will be provided to a variety of different parties—sold directly to patients, provided through government programs, and through employers.
- The ultimate goal of telehealth is to drive patient behavior to lead to clinical intervention earlier.

The Future of Telehealth

For telehealth to succeed and drive greater healthcare efficiency and profits, the industry will need to be prepared to meet these four key market challenges that Frost & Sullivan has identified.

1. How does this let me practice better healthcare? Patient outcomes are paramount. Providing the best healthcare is always the first priority when speaking to healthcare providers. Referrals and internal champions are key.

2. How much money/time am I going to save (or lose)? Why is healthcare so resistant to change? Concerns are founded on how much it takes to do something and whether or not it is efficient. The more a product disrupts the current practice of medicine and the resulting loss of time, the more likely there will be a resistant to make a change in healthcare.

3. How will telehealth information be provided and made actionable? Physicians have an information overload and are not able to process all of the data that exists. Telehealth systems need to provide analytics and support to escalate the levels of patient interaction.

4. Providers must ask: How much risk am I taking in liability? Liability is always a concern for healthcare professionals.

It is critical for telehealth to consider the importance of providing systems and not just technology. "These systems have to do more than just monitor patients but also engage them and make them want to use the systems," said Whelan. "They see value in using these systems. This creates a two-way patient-provider interaction."

Scotland's Commitment to Telehealth

Scotland is seen as on the cutting-edge of the deployment of telehealth solutions. The country has a population of 5.2 million, "which actually makes us an ideal size for delivering national services in a coordinated way at scale," said Professor George Crooks, OBE MBChB MRCGP, Medical Director, NHS 24 and Director, Scottish Centre for Telehealth

SCOTLAND'S COMMITMENT TO TELEHEALTH

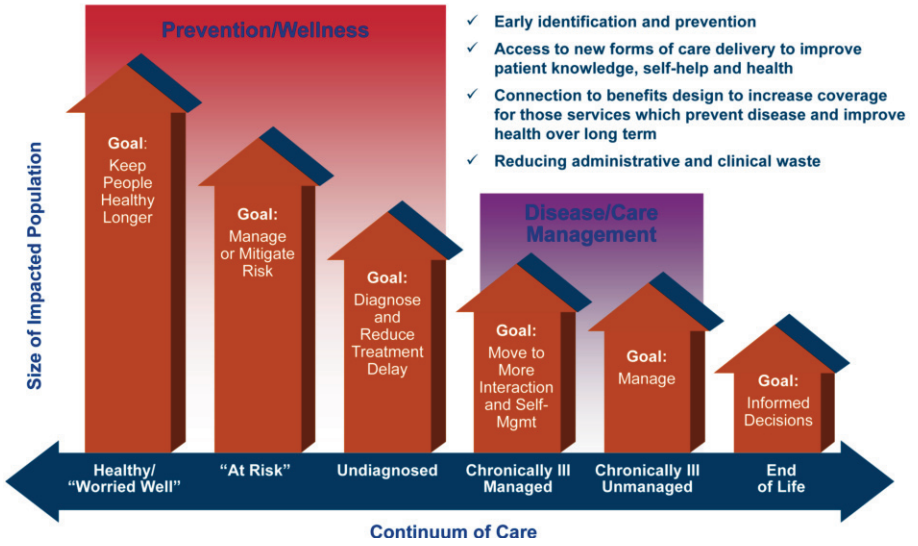
Meeting Telehealth's Challenges of Scale

To meet telehealth's challenges of scale, Scotland has deployed a pilot program of 10,000 technology solutions called DALLAS. DALLAS stands for:

Delivering
Assisted
Living
Lifestyles
At
Scale

The DALLAS program empowers patients to be active participants within their own communities, thus enabling them to improve their own qualities of life, even those confined to their own homes.

From Sickcare to Healthcare



As healthcare becomes more focused on wellness, there will be a shift in spending from end-of-life care to intervening in disease earlier.

& Telecare.

Scotland's National Health Service has a funding of £11.35 billion. The NHS is funded through taxation, which allows for its services to be made free at the point of delivery.

"What sets us apart from the rest of the United Kingdom is that our system is founded on the principles of mutuality, partnership, quality, and increasingly important and key to our future success co-production," said Crooks.

The NHS is committed to existing strategies and actions to support the development and deployment of telehealth solutions.

To meet these goals, the Scottish government has defined its vision to drive healthcare initiatives so that by 2020 the population of Scotland will be:

"…able to live longer healthier lives at home, or in a homely setting. We will have a healthcare system where we have integrated health and social care, a focus on prevention, anticipation and supported self management. When hospital treatment is required, and cannot be provided in a community setting, day case treatment will be the norm. Whatever the setting, care will be provided to the highest standards of quality and safety, with the person at the centre of all decisions. There will be a focus on ensuring that people get back into their home or community environment as soon as appropriate, with minimal risk of re-admission."

Politicians of all parties are committed to the deployment of supportive tech for health and care, said Crooks. But the country cannot succeed without the support of clinicians. To this end, Scotland has the presence of NHS 24, its national provider of healthcare solutions for all 5.2 million people in Scotland.

Future Telehealth Strategies in Scotland

Digital channels will need to be available to appropriately deliver healthcare services and safeguard face-to-face care. "The co-production model can maximize the benefits not only for health services but for patients," said Crooks.

Telehealth has been deployed into 180,000 homes through the end of 2010. As of 2011, a total of £20 million pounds has been spent on funding these deployments in Scotland.

As a result, Scotland has seen a reduction in hospital admissions as well as a reduction in home-care admissions. This has lead to great efficiencies that can be maximized by working with technology providers and healthcare givers, said Crooks.

Over the next three years, Scotland is committed to investing over £400 million to reshaping care through its Change Fund. In 2013, £80 million is earmarked to underpin this integration and service redesign with telehealth a key benefit.

"Don't get me wrong. I do not think that telehealth alone will solve all our problems," said Crooks. "Certainly technology itself is not the panacea to solve all the current issues we and other healthcare systems are facing, but we do believe it is a key component supporting service redesign."

Service redesigns are crucial to making Scotland's health and care systems stay sustainable into the future.

Telehealth's Data Challenges

Wireless data can generate second-by-second data, but how can that data be interpreted and what is the impact of these services?

"We know that the fundamental problem is what do we do with this data?" said Stuart Anderson, Deputy Head and Director of Teaching, School of Informatics, The University of Edinburgh. "We have the capacity to generate enormous amounts of data."

As a sign of the increase in the aging population, in 40 to 50 years time those over 85 years old will make up 5 percent of the population, said Anderson, which will lead to a massive amount of data generated through telehealth services.

Case Study: TeleScot Trials

The TeleScot trials offer an idea of what happens during widescale data monitoring. This small-scale test allowed patients to take readings at home via the internet or short message service (SMS). The data was stored on a remote server, with reminders to the patient to keep reporting. The data was sent to the patient's general practitioner's practice, thus activating a link between the patient and the general practitioner.

TeleScot ran a number of trials, looking at:

Chronic Obstructive Pulmonary Disease (COPD): A symptomatic potentially unstable progressive condition

High Blood Pressure: A common largely asymptomatic condition

Diabetes: A condition requiring multiple measurements, blood pressure, blood glucose, and weight.

Stroke/HBP: Affecting older frailer group with challenging targets.

The COPD pilot study included approximately 30 patients who completed questionnaires and did a number of telehealth measurements with a call center monitoring the data to alert the patient's general practitioner should the patient's scores exceed a safe level.

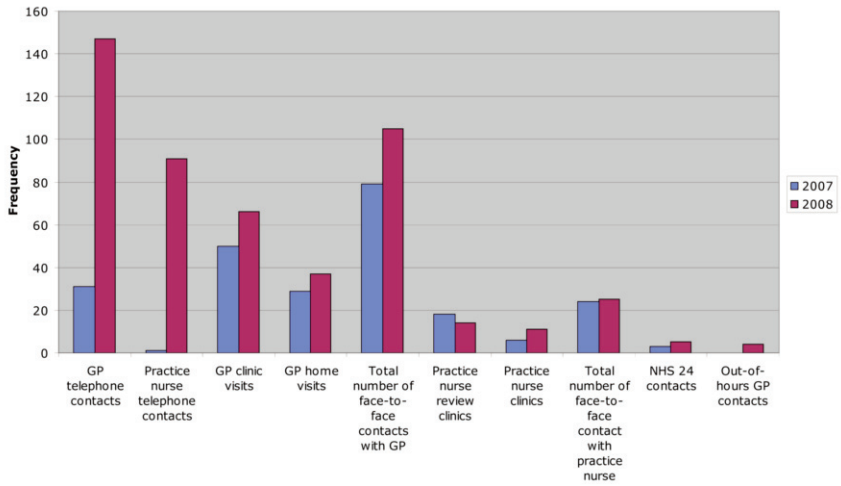
One of the first realizations from this study was that "we were required to have a call center on top of this," said Anderson. "It was actually keeping an eye on the unstable conditions because that imposed too big a demand on the GP practice. That would allow us to form a loop from the call center back to the home, and allow us to send a red flag back to the GP process if that was necessary."

Even in a trial involving only 100 to 150 patients, it was necessary to create a shortcut to manage the data volumes.

Clinician concerns at the end of the trial focused on the workload of managing the data, false alarms, medicalization of more patients, the accuracy and usefulness of self-monitoring data, and worries about any potential legal situations.

By contrast, the patients felt they were carefully looked after and their quality of care was greater.

Effects: Workload



Though patients experienced greater care via the TeleScot trials, clinicians were concerned by an increased workload.

Conclusion: Managing Big Data

Because of the significant increase to the clinical workload, managing data remains a challenge; however, some solutions are available.

The data streams are very complex with high day-to-day variability, making it difficult to make reliable predictions, said Anderson. This leads to a tendency to set low thresholds for alerts, which requires human contact to remain in the data loop.

The main drivers to manage the challenge of big data in the environment of telehealth are:

1. Machine Learning

- Improved algorithms to score symptoms and measurements
- Involving family and wider community in the monitoring process, using social-networks
- Developing better analytics to monitor and advise
- Better analytics will reduce the rate of alerts, but the relationships between data and how the patient feels is complex

2. Learning in the Network

- Empower a social network to filter the data
- Engage with care givers
- Increase the expertise of care givers
- Empower care givers to act as the first line of contact
- Recognize that people have different social contexts
- Solutions need to contextualize
- DALLAS will explore this space through the large-scale deployment of telehealthcare

3. Human Learning

- Injecting education in the environment increases self-management of care

As the TeleScot trials found, patients became more able to handle the self-management of their care. By the end of the trial, patients were at a point where they needed very little assistance and were managing their conditions significantly better than at the beginning of the trial.

In the small scale of these trials, the GP and staff chose adaptive strategies to cope with the increased workload; however these adaptations are not always available at scale.

According to Anderson, the strategies being investigated to enable scaling include better analytics to reduce false alarms and engaging more thoroughly with the care givers.

Patient views on this are highly variable. Any solution must take into account this variability. Building learning communities around patients and their conditions can help general practitioners, patients, and care givers personalize and tailor the telehealth experience and deal with the rapidly growing aging population.

ABOUT SCOTTISH DEVELOPMENT INTERNATIONAL

SDI aims to assist in the growth of the Scottish economy, by encouraging inward investment and helping Scottish-based companies develop international trade.

A joint venture between the Scottish Government, Scottish Enterprise and Highlands and Islands Enterprise Scottish Development International brings together the resources of these organisations to deliver support for companies investing in Scotland. Learn more at www.sdi.co.uk

ABOUT SCOTTISH CENTRE FOR TELEHEALTH & TELECARE

The Scottish Centre for Telehealth (SCT) was established in 2006 to support and guide the development of telehealth for clinical, managerial and educational purposes across Scotland. This involves working across boundaries with industry, academia, local authorities and NHS Boards to develop recognised models for redesigning care.

The Centre's role is to provide support and advice to NHS Boards and help evaluate the potential benefits of new technologies, with the aim of making Scotland a recognised global leader in telehealth. Learn more at www.sctt.scot.nhs.uk

ABOUT THE UNIVERSITY OF EDINBURGH, SCHOOL OF INFORMATICS

The Social Informatics Cluster in Edinburgh works closely with members of ISSTI and with the Edinburgh e-Health Interdisciplinary group. Currently they are working on Information Infrastructures and their role in analysing long-lived, large-scale systems. Learn more at www.ed.ac.uk/schools-departments/informatics

About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best-in-class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation, and implementation of powerful growth strategies. Frost & Sullivan leverages 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from more than 40 offices on six continents. Learn more at www.frost.com

DISCLAIMER

This Executive Summary discusses key insights and excerpts from a live presentation and panel discussion by Frost & Sullivan, Scottish Development International, University of Edinburgh, School of Informatics, and the Scottish Centre for Telehealth & Telecare on March 29, 2012. This summary presents industry insights, best practices, and case studies discussed by the presenters, in the context of the live presentation and panel discussion. For more details, visit http://www.frost.com/health. Frost & Sullivan is not responsible for the loss of original context or the accuracy of the information presented by the participating companies.