

Video Conferencing and Healthcare: A New Chapter in Collaboration

Video conferencing is becoming a more important tool in the healthcare ICT portfolio

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SUMMARY

In a nutshell

Pressure is increasing on healthcare providers to deliver better services more cost effectively and efficiently. The use of electronic health records (EHRs) is already widespread in the healthcare industry, which has resulted in greater digitization of patient information. This has made it easier and faster for different care providers to exchange patient information, such as lab results or x-rays, has improved patient outcomes, and reduced costs.

The next step in patient care is to enhance the level of collaboration between different stakeholders. Ovum believes that video conferencing is the platform that will best enable this. Video conferencing has become an important tool within a wider portfolio of telehealth services, and is being used in a range of different healthcare settings and for a multitude of different purposes. Video conferencing is becoming more prevalent as solution and service portfolios expand beyond the high-end, all-immersive, room-based video conferencing solutions that have traditionally been associated with enterprise video conferencing.

Ovum view

Video conferencing has become a buzzword, and is often associated with important new revenue opportunities. This applies to large telcos, video equipment manufacturers, and systems integrators, many of which have earmarked e-health video conferencing as a key development area. The initial assumption for video conferencing in healthcare was that the often critical nature of interactions would mean that the sector would require high-end, expensive equipment and premium managed services. However, the reality is much simpler. Ovum's research has found that there are a variety of uses and requirements, ranging from mass-market, low-budget desktop solutions to immersive HD systems. For many users (both care providers and patients), video conferencing is one of many communication and data tools that can be used to provide better and more cost-effective care.

In terms of revenue prospects, there is a lot of hype surrounding healthcare video conferencing solutions in the short to medium term. As in other sectors, video conferencing services in healthcare will benefit from the shift to all-IP network delivery, improvements in interoperability, cheaper bandwidth, and burgeoning innovation. However, increasing competition and restricted health budgets will place pressure on pricing. The pure technical requirements for video conferencing are not unique, which means that telcos can leverage existing service portfolios. However, in many cases they won't be able to charge a significant premium, and must develop video conferencing as one aspect of a wider portfolio of managed services and unified communications.

In the long term, Ovum believes that there will be considerable uptake of video conferencing due to the evolution of healthcare delivery and the increasingly central role of information and communications technology (ICT) in improving outcomes, allowing remote consultations, and saving costs. Where the technology has been implemented wisely, there have been numerous testimonies endorsing the advantages of face-to-face contact, video instructions, and video exchanges.

Key messages

The adoption of video conferencing will increase in the medium term

With the costs of healthcare delivery rising rapidly and physicians' remuneration models changing from payment per visit to payment by outcome, Ovum expects the momentum behind video conferencing deployment to increase in the medium term. Video conferencing is a particularly important tool in delivering better care to patients in rural areas as it provides virtual access to specialists.

Video conferencing requires active advocacy in order to overcome adoption barriers

Healthcare provision is in need of fundamental changes to funding, delivery, and overall strategies. Ovum believes that ICT will play a key role in this transformation. However, the execution of this will require the buy-in of all stakeholders. Advocacy from professional bodies and policy development will be particularly important as they are critical in driving and defining mechanisms such as legal frameworks and reimbursement models.

Integration and interoperability are crucial to mass-market adoption

Integration and interoperability are central to the mass-market deployment of video conferencing. Video conferencing solutions must work with existing IT systems, established work practices, and increasingly be compatible with consumer devices. Data privacy is particularly critical in healthcare, and extending services to devices operated and located in patients' and professionals' homes will require effective remote IT support and/or robust plug and play solutions.

Network connectivity is a mixed picture

Many video conferencing events currently take place on healthcare premises, which normally benefit from higher bandwidth and/or dedicated links between locations. However, the growing prevalence of desktop services in smaller buildings and remote areas means that providers must work with varying speeds and bandwidth quality, and where a minimum quality of service (QoS) is unobtainable. Poor broadband access in rural areas is proving to be a bottleneck in some cases.

Video conferencing can help improve care in several ways

Video conferencing improves the access, quality, and productivity of healthcare delivery by providing access to specialists, facilitating timelier and more coordinated care, and assisting knowledge transfer between care providers. This includes sharing the expertise that is usually found in metropolitan areas with care providers in rural areas. When used for triage purposes, video conferencing enables patients to be seen faster by the appropriate care provider, which results in prompter treatment and maximizes healthcare resources as fewer physicians are likely to be involved in a patient's treatment.

Video conferencing is particularly beneficial for certain types of critical care

Video conferencing has proven to be very useful when first assessing a patient in the absence or shortage of local care providers. It is particularly valuable for cardiology/stroke treatment as the

likelihood of effective medical intervention decreases sharply after a short time period. Video conferencing has also been beneficial for emergency room care, dermatology, and psychiatry.

Video conferencing will become more mobile as work practices and treatment locations evolve

Video conferencing will increasingly be used for interactions between doctor and patient. As tablets become more pervasive in healthcare and tablet technology evolves, the uptake of mobile video conferencing solutions will accelerate as it becomes better aligned with the increasingly mobile day-to-day reality of clinicians.

Recommendations

Recommendations for healthcare providers

Identify the business case for video conferencing

Before purchasing equipment or services, it is crucial to identify the business case for video conferencing. This requires a proper understanding of the usage case, processes, network, and equipment required, and the type of communication and collaboration that will be carried out over video. Based on this information, it will be possible to quantify the cost savings and benefits related to improved productivity, total costs, and patient outcomes.

Ensure that video conferencing solutions and equipment fit in with wider telehealth solutions and can incorporate new uses

It is likely that video conferencing will be used in a number of different ways within organizations, and that its usage will be expanded beyond bespoke solutions. Healthcare providers should question suppliers on their product roadmaps and the standards they support in order to make the most of their investment for the medium term. It is crucial for healthcare providers to identify interoperability and inter-carrier issues before they purchase a solution.

Make video conferencing part of an overall e-health strategy

Healthcare providers should ensure that video conferencing is embedded in their overall e-health strategies. This should not just be from a technology perspective that has the solution linked up to patients' medical information; it should also be embedded in work processes, culture, and practices. By ensuring this, healthcare providers will be able to realize the full range of benefits in terms of improved productivity and care.

Consult users and identify supportive stakeholders for effective buy-in and implementation

The implementation of video conferencing is likely to require a significant change to work processes. As a result, it will be important to identify and consult with all users, and use feedback and insights from both service advocates and skeptics to ensure their buy-in and continued support during the early implementation phase.

Recommendations for video service suppliers***Work on interoperability***

Video service suppliers should develop network-agnostic services to reduce the barriers related to usage and geography. They should also work to improve interoperability by partnering with other telcos to enable customers on different exchanges to communicate. This is a growing trend, and presents an opportunity for telcos by easing the interoperability issues that arise with users on different networks. Telcos should establish new partnerships, such as the one between Tata Communications and BT, to take video conferencing into a more network-agnostic environment.

Include software-based (soft-client) video conferencing

Ovum foresees a growing market for the development of software-based video conferencing solutions for PCs, smartphones, and tablets. This will be appealing to care providers as they will not have to invest in high-end, dedicated video equipment for conducting video calls.

Recommendations for video equipment vendors***Work with other vendors to address interoperability issues***

The use of different protocols by vendors in what has traditionally been a closed environment has been a barrier to the wider adoption of video conferencing. Giving users the ability to make seamless video calls across different networks and to different organizations is the key to greater adoption. There have been a number of encouraging steps in this area such as Cisco's opening up of its teleconference interoperability protocol. Vendors need to continue to work together to further increase operability, particularly in light of device proliferation and changes in healthcare organizations and market dynamics.

Help customers to build a business case for video conferencing

Vendors should support their customers in building a robust business case for video conferencing by providing them with factual information on how care delivery can be improved, expanded to

more patients, and rendered more efficient. Initially, vendors should focus on the business benefits of their solution, and should leave the technical details to a later conversation.

Lobby for the inclusion, certification, and payment of video conferencing

The lack of a sustainable reimbursement model is the major hurdle for the more pervasive usage of video conferencing. The main drivers behind developing such a model are professional associations and bodies as they ultimately set the framework for best medical practice. As a result, it is important for vendors to work closely with these organizations to support them on this transformation path. This can come in the form of white papers and user cases that present quantifiable evidence on the benefits of video conferencing.

Increase user friendliness

Vendors should improve ease of use and exploit technical advances to make their solutions user friendly, intuitive, and reduce bandwidth requirements as clinicians have little tolerance for learning how to use new technology. Vendors should explore acquisition, experimentation, and partnership opportunities to help them achieve this.

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AN OVERVIEW OF VIDEO CONFERENCING AND HEALTHCARE

Defining video conferencing

Ovum defines video conferencing in healthcare as face-to-face, realtime communication and/or interaction between two or more people in different locations in both clinical and non-clinical environments. Non-realtime communication and video casting are also included, although they are limited primarily to education and training. Video conferencing solutions range from high-end, immersive telepresence rooms to desktop video conferencing and mobile solutions. Services run on closed IP networks and over the Internet, utilize a number of different standards, and in most cases employ a security protocol.

Certain telehealth services require specific capabilities from video conferencing solutions

Unlike general corporate video conferencing services, healthcare video conferencing requires specific capabilities for certain implementations, including:

- the ability to attach peripheral medical devices, primarily for monitoring, testing, and diagnostic purposes
- mobile video conferencing units, e.g. devices that are transportable to patients' bedsides or different locations within a medical center
- the ability to satisfy minimum security requirements for the transmission of protected health information (PHI)
- the ability to interoperate with the transmission of data (e.g. medical images and clinical data) in both store and forward and realtime environments
- easy-to-use tools and intuitive user interfaces for terminals used by patients or non-technical staff.

Video conferencing is an important tool in the wider portfolio of telehealth services

Telehealth is an umbrella term that encompasses a number of different services, including telemonitoring, clinical telehealth, and tele-education. The common element is that a telehealth service involves the use of a digital network to provide healthcare to a patient that is in a different physical location from the care provider, or to facilitate interactions between professionals involved in the delivery of care. It is often supported by the use of diagnostic devices, and involves the secure transmission of the sound and images needed for the monitoring, diagnosis, treatment, and

follow-up care of patients. For more information on the development of telehealth, see Ovum's report *A Healthcare Provider's Guide to Telehealth (Best Practice Insights)*.

Video conferencing has a broad and rich usage spectrum

Main categories and segmentation

Ovum distinguishes between three main types of video conferencing usage in telehealth:

- remote consultation
- training and education
- administration.

Video conferencing usually takes place between permanent, fixed locations, but may also involve interactions with people temporarily in remote locations or on the move. While traditional video applications typically involve scheduled sessions, healthcare video conferencing needs to have on-demand, ad hoc capabilities.

Remote consultation

Interaction between healthcare professionals

This involves interactions between healthcare providers, and does not necessarily require the presence of a patient. These exchanges can be in the form of clinical consultations (such as a tumor conference or to gain a second medical opinion), or can be for medical research purposes.

Interaction between care provider and patient

This involves interactions between at least one healthcare provider and a patient via video conferencing. The care provider will usually require the solution to provide a patient's relevant medical information in order to accurately diagnose and treat the patient. The majority of these events currently take place in a medical center rather than in a patient's home.

For both forms of remote consultation, the live video stream is often accompanied by the transmission of medical data such as x-rays and lab results in realtime to support the discussion.

Training and education

Tele-education comprises a range of bespoke education and training resources delivered via video conferencing. It is often delivered in combination with e-learning platforms, web conferencing, and other communications solutions. It can be conducted using live interactive video or in a store and

forward environment. Tele-education can involve interaction between clinical staff, or between clinical staff and patients.

Administration

Video conferencing can be used to make the administration of healthcare more effective. This involves the better sharing of administration resources (both human and systems), and reducing travel time and costs. Hospitals that have acquired other clinics and have to manage several sites have found video conferencing to be particularly beneficial.

Mobile location video conferencing

Video conferencing can be used in situations where mobile healthcare is required. Although the majority of video conference interactions in developed countries take place in fixed locations, there are some specific contexts where it is the only means of providing a sufficient level of healthcare. For example, in certain industry verticals (such as the oil, defense, or space industries), it may be necessary to deliver healthcare to remote locations. It can also be used in emergency situations such as natural disasters or warzones, or to extend healthcare from major cities to rural areas.

The services offered by these types of solution are mostly remote consultation and remote imaging. These applications are typically niche deployments that do not entail large-scale implementations.

What is special about video conferencing?

Video conferencing deployments in healthcare already encompass a wide range of different solutions, specialty applications, and usage environments. The wide array of deployments reflects the breadth and depth of healthcare, the complicated process of delivering care systems, and the complexity of the marketplace, which can be highly fragmented. However, it also underlines the considerable potential for future development opportunities.

Video conferencing adds a new emotional dynamic

Proponents and users of video conferencing in healthcare emphasize the emotional richness that video conferencing adds to communication. While the importance of this aspect is difficult to quantify, it should not be underestimated in the provision of healthcare services. Healthcare involves many critical exchanges between professionals and patients, the latter of whom may be in emotionally fragile states. The emotional connection that video conferencing enables provides care providers with the ability to pick up on important nuances, particularly in areas such as mental health and chronic illness management, which is arguably more important than in other verticals.

The role of video conferencing in reducing isolation also applies in the professional sphere. The ability to connect clinicians in remote locations with their colleagues through rich communication tools can be an important recruiting function.

Video conferencing adds a new diagnostic dimension

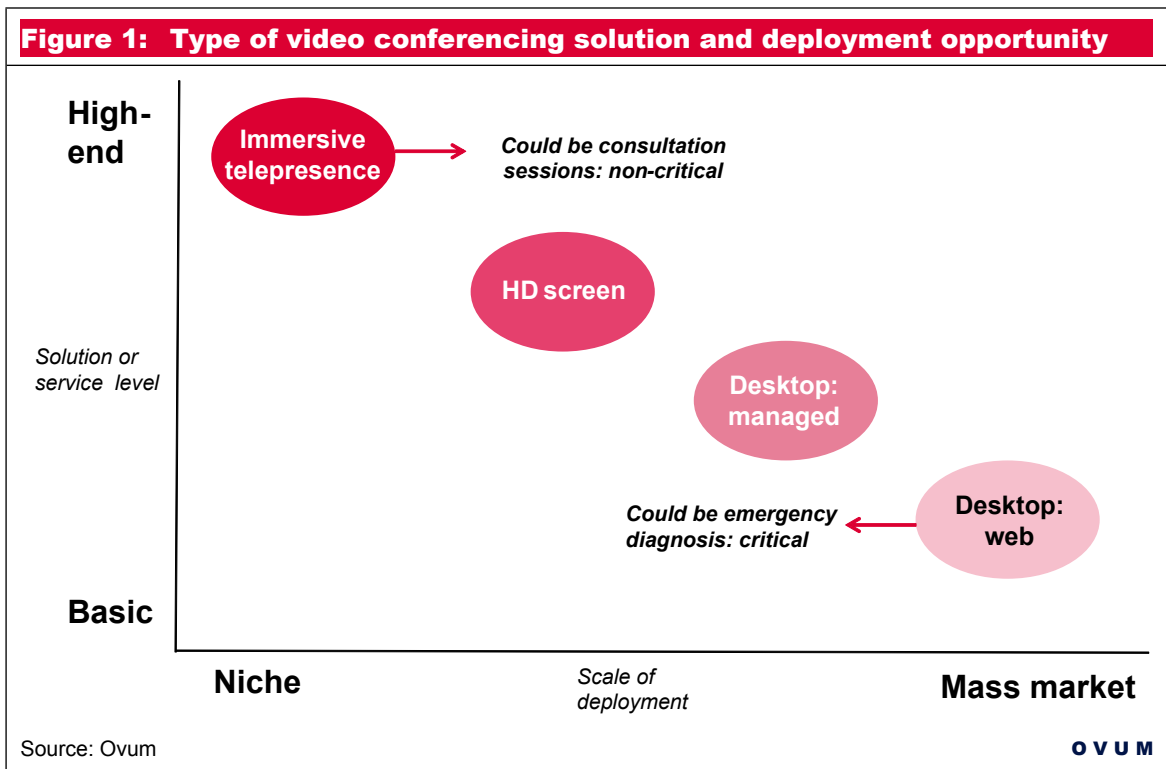
The use of video conferencing for diagnosis is still in its early stages. However, it is beginning to provide an important complementary aspect to diagnosis by enabling:

- the viewing of live footage of patients and their symptoms
- the ability to access additional expertise remotely
- care providers to get more accurate second opinions than they could through printed reports and records alone.

Criticality of the use case doesn't always correlate with a high level of service sophistication or higher revenue potential

Figure 1 shows the broad categories of video conferencing solutions against the scale and revenue opportunity per implementation. High-end, immersive solutions are far more expensive than a service that can be added to an existing managed desktop solution. As video conferencing usage expands, it will increasingly encompass web-based services delivered to consumer devices, which will incur lower revenues per user.

There is often little or no correlation between the critical nature of a video conferencing solution and the level of sophistication and cost of an implementation. For example, immersive telepresence solutions are used for non-critical collaboration in consultation or training between clinicians located in different hospitals. In comparison, there are numerous examples of specialists using basic video conferencing services in small healthcare centers, at home, or even on the move to deliver emergency diagnoses.



This lack of correlation between criticality and cost is an important aspect of video conferencing development as it has ramifications in a number of areas including service-level agreement requirements, legal ramifications, and device/network requirements.

For example, the main advantage of a managed video conferencing service is the ability to record sessions and implement an effective payment and delivery model. However, it may not be practical or feasible to deliver video conferencing as a managed service to all endpoints if the users are deployed across a wide range of different locations and utilize different devices.

This reinforces the point that those in charge of implementing video conferencing solutions must carefully assess the practical requirements for deployment to multiple users with different technical setups. Workable solutions will often entail resourceful, hybrid approaches.

KEY REQUIREMENTS OF TECHNOLOGY AND SERVICE PROVISION

Four core pillars

As shown in Figure 2, Ovum has identified four main technology requirements for the development of video conferencing in healthcare. While secure connectivity and solution and device design are important factors, whether solutions are legally acceptable and interoperable with existing systems, processes, and work practices is equally if not more important.

Figure 2: Video conferencing pillars



Source: Ovum

OVUM

Video conferencing solutions and services have made significant progress

Video conferencing solutions in healthcare have developed significantly over the past five years, benefiting from innovation, technological maturity, and M&A activity within the sector. There has been increased collaboration between equipment manufacturers, software vendors, systems integrators, and telcos, with many players in the latter two segments earmarking e-health as a key vertical market (for more information on this, see Ovum's report *The Enterprise Vertical Strategies of Major Telcos*). For example, Telefonica launched a new e-health strategy and business division in mid-2010, while IBM is promoting e-health innovation as part of its Smarter Planet initiative. The systems integration aspect relates to the increasing emphasis on integrating video conferencing services with broader telehealth and communications solutions.

Some of the most significant developments have occurred around PCs and software clients. These have extended the potential scale of deployments and increased the range of telehealth implementations beyond the more niche use of immersive, high-end telepresence services. These developments provide the following benefits.

- PC-based video conferencing solutions are increasing in quality, choice, and ubiquity. Web conferencing services such as Cisco's WebEx are starting to offer video calling and HD-quality voice services.
- User awareness of PC-based video conferencing software has increased significantly due to the success of video applications such as Skype. The increased presence of these services makes video conferencing more familiar to both healthcare professionals and patients.
- PC-based video conferencing is considerably cheaper than video conference sessions using dedicated video endpoints, and enables ad hoc, video on demand sessions.
- PC-based video conferencing can be easily integrated with companies' existing unified communications deployments.
- Leading video suppliers are starting to offer PC video software and software clients for mobile devices. These include Tandberg with its Movi client, and HP, which plans to have video client software installed on all its PCs at the manufacturing stage through its partnership with Vidyo. LifeSize is also bringing more capabilities to solutions at the lower end of the market.

There has also been an increase in the use of network- and device-agnostic services, such as those available from AT&T and Verizon in the US, which work on a variety of desktop PCs.

Network connectivity provision is mixed

A presentation on the potential impact of Australia's next-generation National Broadband Network lists full HD remote consultation and emergency medicine as key applications that will be enabled by the FTTH network.

While this example of linking FTTH-based, high-speed broadband with video conferencing and healthcare is common, providers are already delivering these services over existing networks. Many current video conferencing services operate over existing dedicated networks that use a combination of different access technologies, including ISDN, xDSL, and Ethernet. This dismisses the view that video conferencing will not gain traction until FTTB/H is ubiquitous. Many closed hospital networks already have sufficient bandwidth to deliver video conferencing at scale and in HD. For example, two hospitals in New Jersey introduced HD video conferencing four years ago for clinician discussions of medical cases with simultaneous viewing of images in HD. In Finland, remote video consultations were offered by 66% of hospitals and used by 17% of healthcare centers three years ago.

Where there is significant enthusiasm for and adoption of video conferencing from users, services are moving beyond closed health networks to home and other remote locations. This includes usage in critical situations. For example, stroke specialists can be consulted for emergency diagnosis when they are at home.

Poor basic broadband is affecting performance and uptake

There is a basic threshold for broadband quality that incorporates five main metrics: speed, consistency, up-time, jitter, and latency. Poor broadband connectivity may have an adverse impact on the uptake of video conferencing as it has higher minimum requirements than applications that do not have to be delivered in realtime, such as the transmission of medical images or patient data.

An example of this comes from a 2010 study that compared the deployment of e-health solutions in rural areas in Finland, Sweden, Norway, and Scotland. Poor broadband connectivity in Northern Scotland and Finland impacted negatively on the rollout of certain services, including video conferencing. Limited and unreliable bandwidth was also an issue in a recent pilot study conducted by O2 on the use of video conferencing between patients' homes and medical centers.

Video conferencing can make use of existing network assets

Video conferencing solutions will perform better if they do not require high bandwidth in the access network. However, services such as telepresence will definitely require dedicated bandwidth and a

minimum QoS. Many healthcare organizations – ranging from small surgeries to large hospitals – are already connected to private networks. These range in scale from a handful of hospitals to national networks such as the UK's N3 broadband network and Norway's Northern Norwegian Health Net.

The existence of these networks means that video conferencing solutions can be deployed without significant additional expense. For example, in the UK, the N3 network provides approximately 40,000 National Health Service (NHS) connections in England and Scotland. It currently supports digital applications such as automated bookings and picture archiving, and is now being used to provide a managed video conferencing service to support multi-disciplinary teams in the Anglia Cancer Network. There are two important aspects to this implementation:

- video calls to other sites on the N3 network are free of charge
- it already accommodates off-net calls through dial-in over ISDN, and BT is introducing an IP guest gateway service.

The challenge for driving further adoption, particularly in the home and locations outside of a managed network environment, is to support the security and QoS conditions that will be required for some video conferencing sessions.

Integration, inter-carrier, and interoperability are crucial enablers

Video conferencing services are still hampered by interoperability issues. However, as Ovum discussed in the report *The Future of Video Conferencing*, these are being addressed. Integration, inter-carrier, and interoperability are significant issues in the provision of e-health in three major ways.

- The interoperability of video conferencing services across networks and between different vendor solutions. Vendors are addressing interoperability by opening up their protocols and working more closely with competitors. While telcos are also addressing the issue by enabling calls across networks, there is still a long way to go.
- The integration of video conferencing with other communications tools and complementary data systems. The use of video conferencing within wider unified communications solutions and the need for the transmission of medical data and images means that video conferencing needs to work effectively alongside other service portfolios. This increases the requirements for systems integrators and multi-vendor solutions.

- The integration of video conferencing implementations into existing networks as service footprints are extended to regional, national, and international endpoints. This is especially an issue in countries where healthcare is more localized, fragmented, and delivered via private health providers, and where there is pressure to roll out services across different health networks.

These issues are important as they have significant cost ramifications, and have an adverse impact on time to market and usability.

Legal and regulatory compliance

The legal and regulatory requirements involved in the implementation of video conferencing in healthcare interactions – including in consultation, communication, and data transactions – is far more important than in most other verticals. This is because of the data capture and security requirements that are specific to patient–doctor confidentiality, and the issue of liability. In terms of technology, these aspects result in requirements for minimum functionality in the following areas.

- **Data capture.** This involves the recording of data that may be used simultaneously with video conferencing; for example, data related to a patient's symptoms and reactions. It also involves the video conferencing sessions themselves, particularly in critical situations such as emergency diagnosis.
- **Secure connectivity.** Services must comply with a country or healthcare provider's security guidelines or specific requirements. For example, in the US, the Health Insurance Portability and Accountability Act (HIPAA) dictates that video conferencing should be treated like any other PHI data stream. This involves implementing a 128 bit Advanced Encryption Standard as the minimum key size for secure video communications and maintaining compliance.
- **Storage.** Privacy protection laws currently dictate that the storing of video conferencing sessions is not allowed. However, the main findings of a video session can be stored in a patient's EHR. Some care providers are in favor of storing video sessions as they could be used as evidence in malpractice lawsuits.

There may be significant cost and service benefits in implementing cloud-based solutions, but these must be accompanied by robust electronic “paper trails” whereby interactions can be recorded and accessed according to legal guidelines and frameworks.

Innovation in video conferencing and complementary areas such as storage and data retrieval may result in more effective treatment and greater efficiency. However, it is the healthcare provider that ultimately holds clinical responsibility. New approaches involve a larger element of risk, and

require consultation with stakeholders and the relevant legal and regulatory bodies to allay provider fears over issues such as liability. This inevitably slows down the adoption of new processes and technologies.

THE USER PERSPECTIVE

Context is more important in healthcare than in other verticals

The wider e-health context is critical

Collaboration is intensifying between different stakeholders in the healthcare ecosystem. In the case of accountable care organizations in the US or GP commissioning boards in the UK, healthcare systems sometimes incentivize successful collaboration. Ovum expects this trend to accelerate as it allows for more cost-efficient delivery of healthcare, and can lead to better care for patients. In order to better cooperate, users can employ a number of e-health solutions, including EHRs, health information exchanges, telemonitoring, and video conferencing. Users regard video conferencing as a useful service that complements many of the other ICT-based tools being adopted. As a result, suppliers need to understand the different market contexts, and the advantages that video conferencing can provide over other solutions.

Video conferencing implementations in healthcare

Multiple uses and requirements

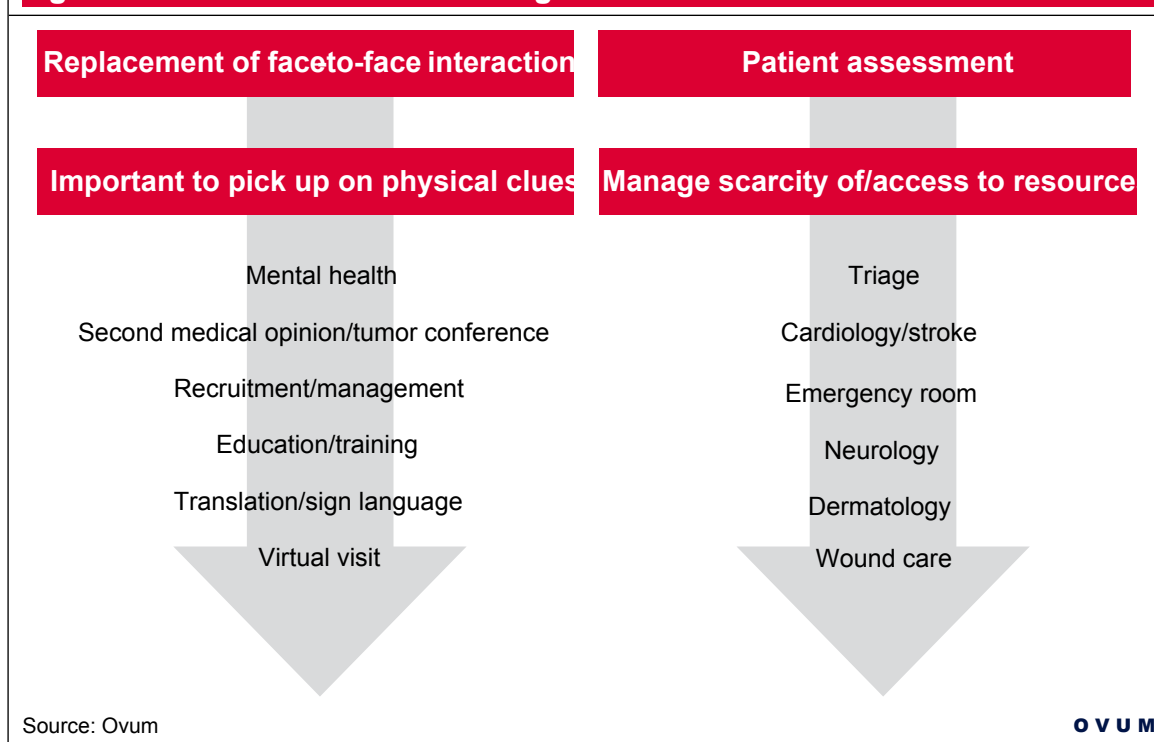
Table 1 outlines a number of different video conferencing implementations in healthcare. The fact that this is just a small sample of deployments underlines the wide variety of solutions in this segment. One of the most important aspects of any video conferencing solution is the flexibility and adaptability of suppliers in both understanding the specific requirements of healthcare providers and in adapting solutions to be fit for purpose. However, this does not rule out simple, scalable solutions. For example, Telefonica has delivered a web-based desktop video conferencing solution on a relatively large scale to hospitals in Spain. The key aspects of Telefonica's solution have been ease of installation and the fact that the implementation uses existing ICT equipment and systems. In the US, AT&T and Verizon have targeted healthcare as a key vertical solution market, and are including video in many use cases and healthcare programs.

Table 1: Example uses of video conferencing

Usage	Nature of interaction	Example
Neurological consultation	Critical and non-critical/clinical	Large national US health system
Stroke diagnosis	Critical/clinical	Cardiological clinic in Bad Oeynhausen, Germany
Dermatology	Non-critical/clinical	Canada Health Infoway
Specialist training	Non-critical/clinical and non-clinical	Leeds Teaching Hospital in the UK for keyhole surgery training
Administration	Non-critical/non-clinical	Used in the US for recruitment and management purposes

Source: Ovum, vendors, service providers

Video conferencing is useful in situations where seeing the other person adds value compared to just hearing someone's voice or having a patient's medical information. As shown in Figure 3, video conferencing in healthcare is particularly successfully when it replaces face-to-face communication due to the geographical distance between the participants, or where patients need to be assessed in the absence or shortage of local care providers.

Figure 3: Use of video conferencing in healthcare

Replacement of face-to-face interaction

Video conferencing is the preferred choice when geographical distance does not allow for a face-to-face meeting but there is a need for an encounter that is as close to a life meeting as possible. This approach has been successful in the following settings, but is not limited to them.

- **Mental health.** Video conferencing has been used effectively in North America and Scandinavia to overcome a shortage of mental health experts in rural areas. Denmark has been experimenting with this type of care provision, and has established daily video conferencing calls with patients. These calls are reported to be very helpful in the treatment of patients.
- **Second medical opinions.** Video conferencing provides patients with a convenient method to get a second medical opinion. In Germany, the number of implementations set up for the sole purpose of offering this service through video conferencing is increasing.
- **Tumor conferences.** Case discussions between care providers are common in the field of oncology, and are generally referred to as “tumor conferences”. Typically,

doctors from a number of different specializations take part – including surgeons, oncologists, pathologists, radiologists, and radiotherapists – to discuss the best treatment plan for a given patient. In Hull and East Yorkshire in the UK, the NHS uses multi-disciplinary tumor conferences to improve cancer care. While the initial consultation is still conducted in person, the ongoing dialog between care providers is held via video conferencing. Consultants have driven the implementation of these solutions, which are occasionally implemented in their own homes. T-Systems is providing a tumor conference platform in the south of Germany where hospitals and GPs in the region attend regular tumor conferences via video conferencing.

- **Recruitment.** Video conferencing has been useful in replacing face-to-face interviews for the recruitment of physicians.
- **Clinical management.** The global trend towards the consolidation of hospitals into larger entities calls for more collaboration between different hospital sites. Using video conferencing for clinical management has proved to be beneficial as it helps to save travel time and costs.
- **Education/teaching.** Video conferencing has been beneficial in teaching medical staff and educating patients. For example, Leeds Teaching Hospital, which is a center of excellence for keyhole surgery, pioneered the use of video conferencing in post-graduate teaching by installing a live video link between an operation theater and a lecture theater.
- **Translation.** Video conferencing can be used when a patient and doctor do not speak the same language and no translator is available. The need for a video link becomes especially crucial when the patient can only communicate in sign language but the care provider cannot.
- **Virtual visits.** Video conferencing can be used to enable virtual visits in the form of doctor-to-patient or family-to-patient visits. They can also be used to provide medical care to prison inmates or allow patients with contagious illnesses to stay in touch with their loved ones. This can help to speed up the recovery process. For example, during the bird flu scare, some reserves for Canada's indigenous population used video conferencing solutions to connect quarantined community members with their families.

Patient assessment

Video conferencing is particularly useful when first assessing a patient in the absence or shortage of local care providers.

- Triage. Video conferencing has made a significant difference to triage, and has helped to improve patient outcomes due to the faster decision-making process that the technology enables. In the US, this approach has already been adopted outside of the traditional care provider field, with school nurses using it to determine which school within their district they have to attend in person.
- Emergency room (ER). Video conferencing is generally used in an ER setting as a second-best approach when there is a shortage of available care providers. In these cases, the use of mobile video conferencing solutions is common.
- Cardiology/stroke. The majority of cases treated in an ER via video conferencing are patients suffering from a suspected stroke. When a patient is brought into an ER suffering the symptoms of a stroke and a clinician is not on hand, the hospital can take a video conferencing cart to the patient's bedside and connect to a clinician who is working on a rotational basis. The location of the clinician on the call is irrelevant as long as they can log into the network. A hospital may also not have any cardiology expertise available, and can use the video link to work with a regional stroke center. With these measures in place, it is much more likely that patients can be treated in a timely manner, which is crucial for stroke patients.
- Neurology. As with cardiology, neurology has benefited from the use of video conferencing. The uptake of the technology has been strong in the US as it is relatively easy to conduct a remote stroke exam or assess a patient's motor skills through a video link.
- Dermatology. Dermatology is well suited to video conferencing as it requires the care provider to actually see the skin and its coloring rather than having the patient describe it.
- Wound care. Patients' wounds can be looked after successfully by medical staff using a video link.

Telehealth adoption

Who makes the decision for the adoption of video conferencing?

Typically, several groups decide on whether to adopt video conferencing, including doctors and the managers that are purchasing the solution. However, the use of video conferencing tends to be driven by the clinical side. When looking to implement and run a video conferencing solution, healthcare organizations often decide to involve third parties or outsource the service completely rather than involving their internal IT departments. This makes good business sense as internal IT

departments tend to lack expertise in implementing and running video conferencing solutions or in transforming workflows.

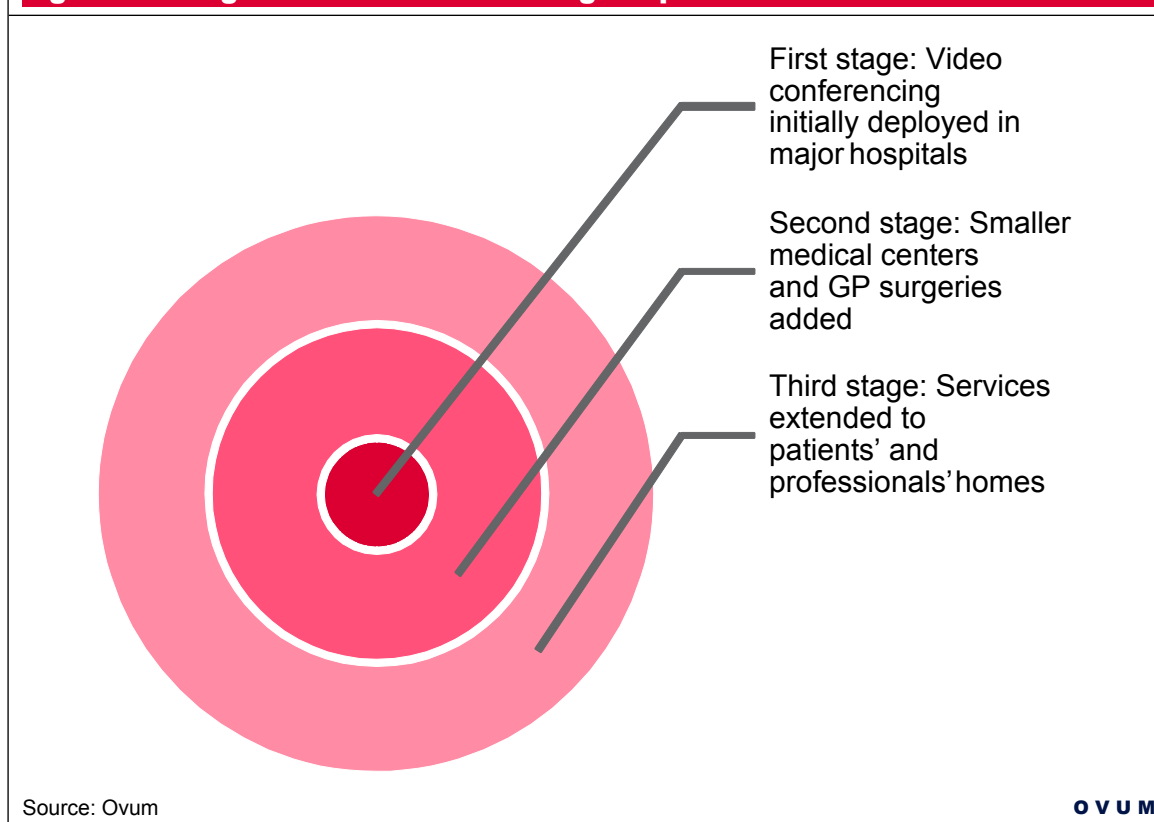
National health networks build important foundations and can act as “anchor” tenants

Some markets are more advanced in terms of having implemented national telecoms networks that support a wide variety of telehealth services such as video conferencing. There is a clear correlation between these markets and the wider adoption of video conferencing. For example, Sweden’s Sjunet is a secure IP network used to deliver video conferencing, teleradiology, remote access to applications, database access, secure email, electronic data interchange messages, and IP telephony. It connects hospitals, primary care centers, and in some cases, patients’ homes. The network is managed by Carelink, which cooperates closely with county councils and other stakeholders within the network.

In Wales, IT solutions and managed services provider Logicalis operates the national Public Sector Broadband Aggregation Network. It delivers multiple public services, with healthcare provision as a key anchor tenant of the network. The majority of NHS sites in Wales (including hospitals and GP surgeries) are connected.

As shown in Figure 4, the adoption of telehealth services typically occurs in an organic way, with central hospitals connected first, followed by smaller medical centers and patients’ homes. This is particularly relevant for video conferencing where limited broadband connectivity is an issue for remote surgeries and patients’ homes.

Figure 4: Stages of video conferencing adoption in healthcare



Health networks can have a positive incremental effect on telehealth advocacy

An important aspect of telehealth adoption where healthcare organizations have implemented a single, common network has nothing to do with the benefits of a common technical platform. The deployment of these networks also involves altering working practices and building awareness of the benefits provided by the technology. As a result, the Swedish government states that Sjunet is “as much a cooperative network as it is a technical communication platform for Swedish healthcare”.

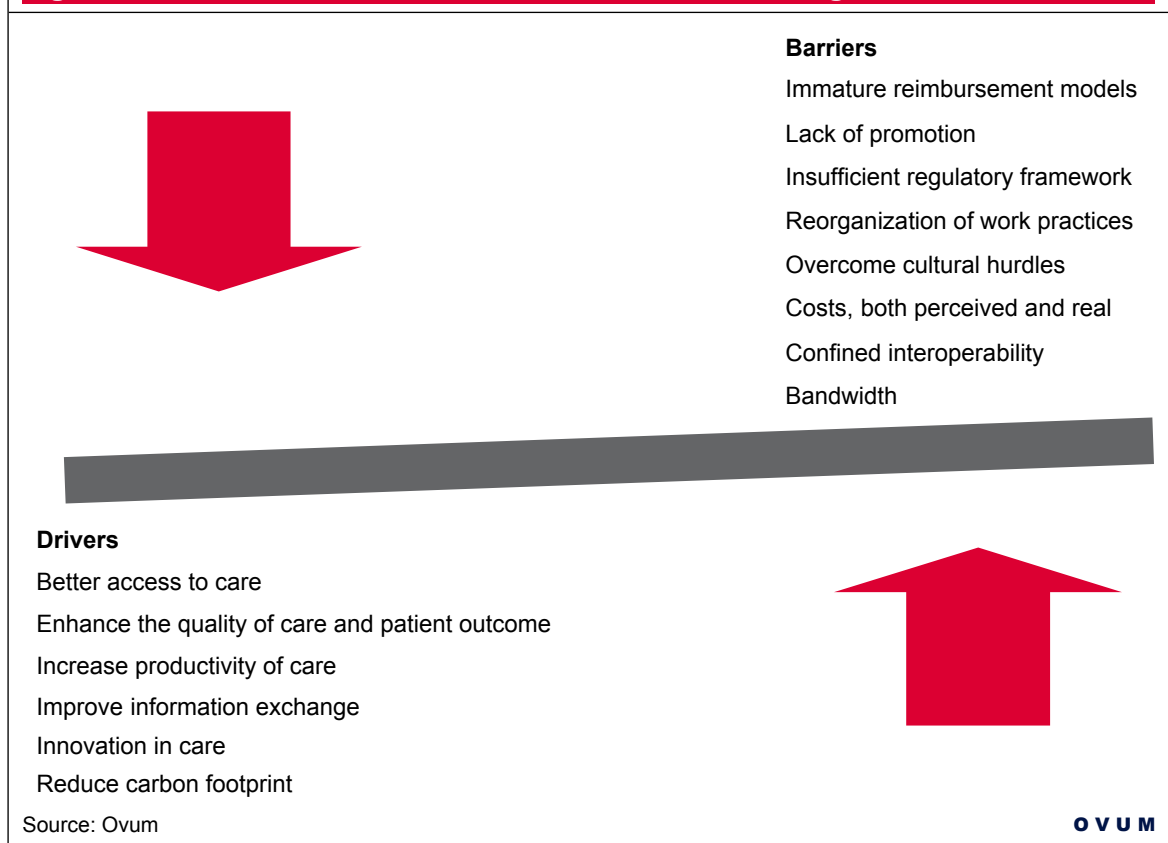
Drivers and barriers to video conferencing in healthcare

The use of video conferencing in healthcare in developed countries is emergent and not part of mainstream healthcare provision. Although there has been a lot of publicity surrounding users' unwillingness to adopt the technology, research into the subject actually reveals a latent demand for video conferencing. However, there is an entire spectrum of intangible benefits of telehealth in addition to the tangible advantages of improved access, quality, and productivity of healthcare

delivery. For example, hospitals with access to telehealth and video conferencing facilities find it easier to fill vacancies than those without them as younger physicians prefer working with these types of collaborative tools.

The barriers to video conferencing have more to do with unwieldy processes, budget restrictions, and difficulties in transforming work culture than with technological issues. The strongest barrier to adoption is that video conferencing usage is not being incentivized properly. This needs to be overcome if the technology is to become part of everyday medical practice.

Figure 5: The drivers and barriers of video conferencing in healthcare



Drivers of video conferencing in healthcare

Better access to care

Urban areas are usually better equipped with primary and secondary care facilities than rural areas, where there is often a shortage of specialists. For example, in the US, 25% of citizens live in rural areas, but only 10% of the country's doctors are based in these areas. Video conferencing

enables healthcare providers to overcome this geographic gap, and has been used effectively in countries with large remote populations such as Canada, Sweden, and Finland. Patients generally go to a local care provider to conduct a video session with a remote specialist. In dermatology, where experts are in high demand, video conferencing has reduced the time to treatment from months to a few days.

Enhanced productivity of care

There are a number of ways that video conferencing can reduce costs, including the following:

- lower travel costs for care providers and patients
- less need to build new care facilities in remote locations
- the use of remote wound care has resulted in cost savings of up to 50% compared to conventional treatment.

Using video conferencing also allows for a more efficient use of care providers' time as they can use the time they would have otherwise spent travelling to see additional patients.

By replacing a doctor's visit with a virtual visit via a video link, patients can save on the time and cost associated with visiting a doctor in person. Canada Health Infoway reports that video conferencing saved patients 47 million kilometers of travel in 2010. The Peterborough and Stamford Hospitals NHS Foundation Trust in the UK found that the use of video conferencing reduced their travel expenses by £150,000 per year. This amount was in addition to the estimated £800,000 that was saved by eliminating the time needed for clinicians to travel between geographically dispersed sites.

Help in screening ailments and faster channeling to the appropriate physician

Video conferencing is beneficial as a screening facility to triage medical problems in remote and rural areas and/or emergency situations. The technology enables care providers to quickly determine which healthcare professional a patient should see or which is the best treatment option. This reduction in wait time usually results in a faster recovery for the patient as the appropriate treatment can be administered in a timelier manner. This is especially crucial for the care of stroke patients, where it can be a question of life and death if care is not given within a certain time period.

Improved information exchange

Video conferencing enables the sharing of information and networking between care providers located at different sites. This can contribute to better informed decision making, which ultimately results in improved patient outcomes.

To ensure that the relevant information can be accessed, exchanged, and stored, it is important that video conferencing solutions are integrated with other clinical systems, particularly EHRs, picture archiving, and communications systems. It is also important that high-level summary notes of video sessions are stored in EHRs as stored video can provide doctors with a more accurate assessment of a patient's history and clear visual records.

Innovation in care

The use of video conferencing can lead to new forms of collaboration and novel treatment methods. The realtime engagement between care providers facilitates knowledge transfer between physicians, and reduces the isolation of medical teams. The realtime encounter between care providers and patients tends to lead to greater patient empowerment and compliance with treatment plans.

In Latin America, video conferencing has been instrumental in the creation of so called "telehealth networks", which have reduced the need to construct new care facilities in remote locations by placing video conferencing solutions in publicly-owned buildings (such as schools and offices) and linking them to hospitals. This approach could be applied to remote regions in developed countries.

Reduce carbon footprint

The reduction in travel times enabled by video conferencing can lead to significant reductions in carbon emission levels. In the UK, Ovum estimates that video conferencing would enable the NHS to realize greenhouse gas emission savings of 150 tons per year.

Barriers to video conferencing in healthcare

Immature reimbursement models

The lack of a business model that allows health providers to be reimbursed for video conferencing is the greatest challenge to the widespread use of the technology. If medical staff cannot charge for conducting video conferences, then there is little incentive to use them. Reimbursement practices by healthcare payers, including government healthcare programs and private insurance

companies, need to change. This issue is closely linked to how physicians are paid. When the current volume-based payment model (pay per visit) is replaced by one based on results, the use of telehealth services will increase. Physicians are hesitant to invest in new technologies until they know that the innovations will not burden them financially. Currently, hospitals that form part of large corporate organizations, such as Kaiser Permanente in the US, are the only healthcare organizations that have the financial resources available to implement telehealth and video conferencing solutions. GPs typically don't have the time, money, or incentives to adopt new technologies.

While few developed countries have established video conferencing solutions, a number of pilot programs have been launched. In the US, Medicare (the US government's health insurance program for those aged 65 and over) now funds video conferencing. The deployment of healthcare IT is traditionally linked to the size of a country's rural population as a geographically dispersed population requires medical care across large distances, and patient information often has to be exchanged between diverse healthcare providers. However, this can only be achieved if an adequate IT infrastructure and legal framework that is conducive to data exchange is in place. This is the case in Australia, Canada, and the Nordics, and as a result, most of the examples of video conferencing solutions come from these countries. Some Australian states have developed a reimbursement model that gives GPs A\$2,500 to set up telehealth services, and then pays them A\$25 per consecutive video session. A model similar to this is crucial in enabling mass-market deployment.

Lack of promotion by influential organizations/people

Reimbursement models are not set in stone and can be altered. However, for this to happen, health providers' professional bodies and associations need to promote the deployment of video conferencing and telehealth. This is slowly starting to occur, and is often inspired by the medical associations' own members' experiences with video communications. For example, after using Skype with her family, one member of the Royal College of GPs wondered in public why she could not use video conferencing for interacting with her patients. If medical associations and major private healthcare providers establish video conferencing as a best practice solution for healthcare, its reimbursement will follow, and GPs will begin deploying the technology on a larger scale.

Insufficient regulatory framework

Each country has a regulatory framework that establishes the extent to which telehealth and video conferencing can be practiced. Without legislation in favor of telehealth, it will not be possible for healthcare providers to legally practice video conferencing, and vendors will not be able to sell

solutions to these markets. In some countries, the provision of telehealth services is legal as long as its practice complies with professional codes of conduct, respecting both the obligations of medical professionals and patients' rights. Regulations in these countries focus mainly on licensing, liability, and privacy.

Licensing and liability remain a weak point

The use of video conferencing raises issues around liability, such as whether a doctor is licensed to practice in the area that a patient is calling from. For example, American Well.com, a social network for doctors and patients, provides video conferencing sessions between GPs in the mainland United States and patients in remote areas of Hawaii. For this service to be legal, participating doctors must be licensed in Hawaii. These requirements make the practice of video conferencing far more complex.

Privacy

One of the major concerns related to video conferencing involves patient privacy and the protection of personal data. In the US, the healthcare industry must comply with HIPAA guidelines for securing personal medical data, which only allow doctors to use patient data without their consent for three purposes: treatment, payment, or healthcare operations. HIPAA allows hospitals to use public networks as long as the patient consents to their doctor communicating with them via the Internet.

In the EU, France is the only country that provides a clear legal basis for telehealth. In other countries, telehealth services are allowed as long as they comply with professional codes of conduct, and respect the obligations of medical professionals and patients' rights. This is the case in Denmark, Finland, the Netherlands, and the UK. Other countries in the EU don't support the provision of telehealth services as they require a patient and a health professional to be in the same place for a medical act to legally take place. Countries that do not recognize the concept of providing healthcare services where the patient and provider are at different locations discourage the deployment of telehealth services. This is the case in Poland, which does not allow remote diagnosis as it is assumed that a proper assessment requires physical contact with the patient.

Reorganization of work practices, standard methodology, and processes are required

For video conferencing to become an integral part of healthcare delivery, it must fit seamlessly into existing processes. This refers equally to work practices and wider IT environments. The implementation of video conferencing solutions can cause significant disruption, and often requires

the reorganization of important aspects of care provision ranging from EHR integration to reimbursement incentives. This is why video conferencing is more easily introduced and accepted when it is implemented as part of wider healthcare reform measures, or as part of larger ICT projects. The Canada Health Infoway project, which is designed to increase the adoption of EHRs, is an excellent example of the introduction of video conferencing alongside store and forward and telemonitoring solutions.

Clinicians are often reluctant to adopt video conferencing solutions as they are seen as an intrusion into the way that they are used to practicing medicine. Parts of the medical profession also have concerns around the repercussions that the wide deployment of video conferencing could have on the doctor–patient relationship. Some care providers believe that the immediacy of treatment and contact may be lost due to the lack of physical examinations. They fear that this could depersonalize the relationship and result in patients changing their care providers more frequently. This apprehension is much less common among younger professionals and technology enthusiasts.

Interoperability issues

It is crucial that video conferencing solutions can interact with and feed information into other systems such as EHRs. If data cannot be transferred due to a lack of interoperability caused by the absence of common technical standards, patient data cannot be shared between care providers and the full benefits of e-health cannot be realized. Complications can also arise when different vendors' equipment is used, which can result in poor quality video, or a video call not being possible at all. In order to facilitate the widespread use of video conferencing and enable it to benefit from economies of scale, standardization is a necessity. However, there are not yet any binding standards in the industry.

Insufficient connectivity can become a bottleneck

The more sophisticated and mission-critical a video conferencing solution needs to be, the more demands it puts on the network in terms of reliability, speed, and the ability to prioritize data. At a bare minimum, video conferencing solutions require a broadband connection and a network that is capable of transmitting relatively high levels of data in both directions with minimum latency and high reliability. Depending on the technology used, the physical characteristics of the line, and the location of users, the bandwidth and latency of a connection can differ greatly. Most care providers can only conduct video conferences between sites belonging to their own organization, with only a few able to call other stakeholders. This lack of connectivity has resulted in the usage of video conferencing endpoints being among the lowest of any IT equipment, and it poses a significant hurdle to the large-scale deployment of video conferencing.

THE SUPPLIER OPPORTUNITY

Business model development

Tier-1 and tier-2 providers are driving new delivery and charging approaches

The long-term revenue potential for e-health is significant, and video conferencing will be an important feature of the wider telehealth revenue mix. However, the significant barriers to widespread adoption mean that suppliers are seeking new ways to incentivize uptake, and are looking to bundle video conferencing with other services.

Healthcare providers are increasingly unlikely to purchase standalone video conferencing services, which has been the historical adoption pattern for high-end, immersive solutions. While smaller deployments may result in faster time to market and better returns on investment, there is little opportunity for scale. Providers themselves are looking for greater buying synergies, with the NHS in the UK, for example, forming conglomerates to purchase bundled digital hospital services.

This means that there will be a greater role for tier-1 and tier-2 players such as IBM, Accenture, Telefonica, BT Global Services, and Logicalis in driving the adoption of video conferencing by developing new delivery and charging approaches.

Some of the most important trends mirror those in the enterprise segment, while some are unique to healthcare.

- Cloud delivery. IBM is developing a cloud-based approach to telehealth, and new financing models to help clients deploy services in a more cost-effective way.
- Managed service delivery. Healthcare providers are increasingly purchasing video conferencing as a managed service.
- Changing charging models. There has been a shift away from volume-based charging towards charging based on the number of endpoints supported within a service network. This is particularly the case where telepresence is sold as a managed end-to-end service, and where video conferencing is sold as part of a wider service portfolio.
- Healthcare providers are moving away from capex-intensive models, and are instead focusing on monthly rental approaches and/or equipment on a pay-per-use basis.

Increased pricing competition and low cost per user expectations

Competition is increasing for the provision of telehealth services, and this is having an impact on pricing as healthcare providers become more adept at leveraging their existing assets and selecting suppliers. Healthcare budgets may only allocate very small amounts per patient per day. So even when uptake expands to thousands of patients, revenue opportunities may be relatively modest, and will only start to increase over a three- to five-year timeframe.

Revenue potential: preparing for medium-term growth

Active advocacy and progressive policies will play a key role

Healthcare provision is in need of fundamental changes in terms of funding, delivery, and overall strategies. Ovum believes that ICT will play a key role in this transformation. However, translating this into reality will be a long, difficult, and slow process that will require the buy-in of stakeholders from across the industry. This is particularly true in the case of policy development and advocacy from professional bodies, both of which are extremely important in driving and defining mechanisms such as legal frameworks and reimbursement models.

The uptake of video conferencing solutions will improve when healthcare providers are better incentivized to adopt them, and if their use is mandated and encouraged within wider e-health targets at a policy and legal level. This has been the case with EHR activity in many countries. For example, in the US, a significant portion of the \$20bn earmarked for healthcare IT is being directed towards EHRs. This is largely due to the HIPAA, which states that every US citizen should have an EHR by 2015.

Faster emerging market adoption could drive developed market uptake

Emerging markets are often overtaking developed countries in the use of ICT for healthcare as there are no legacy systems to be considered. This is particularly the case in the Middle East and Asia-Pacific, where telehealth forms part of the fundamental architecture in the rollout of wider connected city and greenfield digital hospital projects.

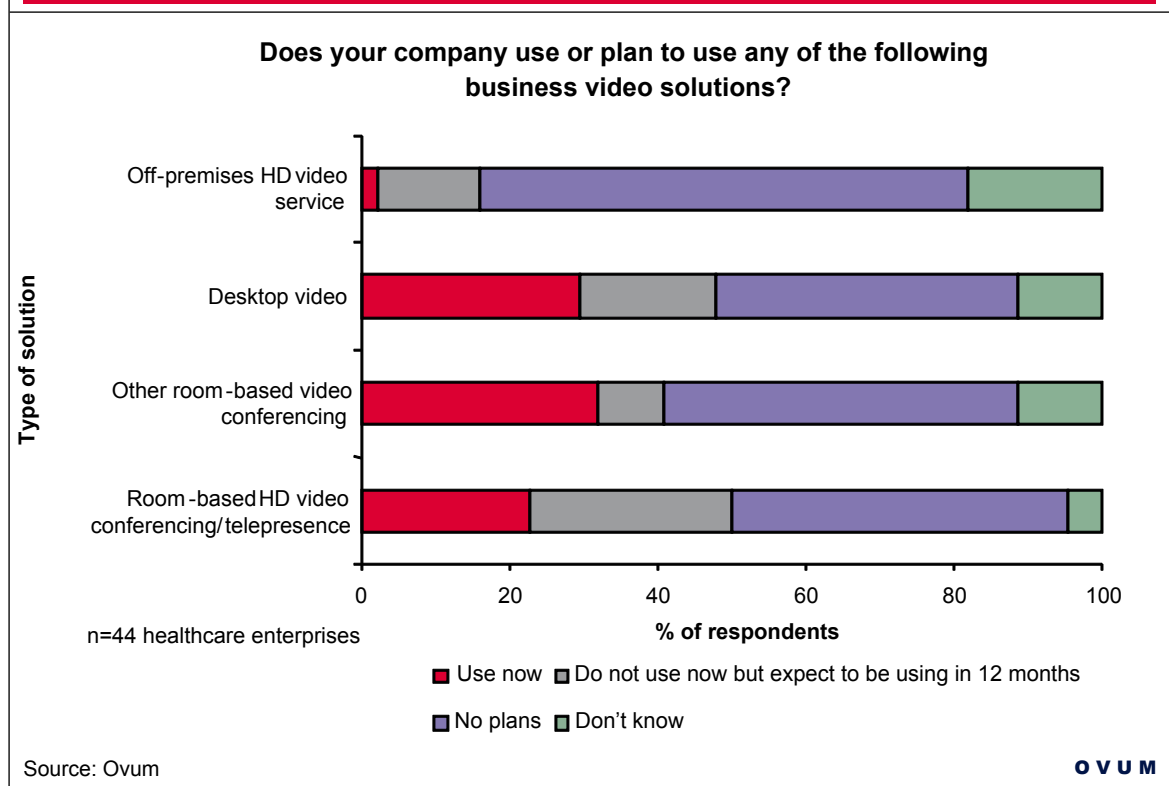
In regions such as Latin America, limited healthcare facilities combined with pressures to improve the standard of living have resulted in increased enthusiasm for ICT as a way of making the most of limited resources. In Chile for example, Telefonica is working with healthcare providers to connect rural areas with hospitals.

The faster pace of development in these regions will spur investment in North America and Europe as regions increasingly compete on outcomes, particularly where healthcare providers compete in specific disease treatment areas.

Desktop adoption is the engine for medium-term growth

In January 2011, Ovum conducted a survey on the usage of video conferencing services among medium-sized healthcare enterprises across 12 countries (including Australia, France, Germany, Italy, Spain, the US, and the UK). Figure 6 shows that most respondents used general meeting rooms not designed for video conferences, dedicated video desktops, and to a lesser degree immersive HD room-based solutions. However, in the next 12 months, the use of immersive room-based and desktop solutions is expected to grow strongly.

Figure 6: Current and planned use of video conferencing solutions in healthcare



Shift from dedicated desktops to general purpose PCs and soft clients

Ovum anticipates that there will be a shift from dedicated video devices to the use of general-purpose PCs for conducting video conferences. This is in line with the growth trajectory of home telehealth management. IBM estimates that 70% of the healthcare video conferencing market in the US currently involves interactions between professionals. However, IBM states that interactions between professionals and patients at home are growing at a faster rate.

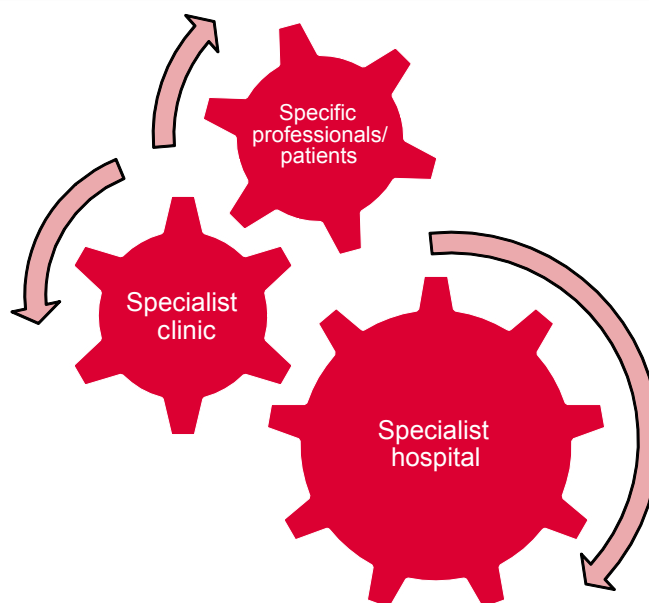
Technology, innovation, and adoption roadmap

Vertical specialization will be a key area for innovation and adoption

Ovum expects that there will be increasing activity and innovation in the development of solutions and strategies for the treatment of specific diseases, particularly those that place a significant burden on healthcare systems. Video conferencing will play an integral part of this process. This will also be important in light of the competition between countries to become centers of excellence for disease treatment.

Requirements for individual disease treatment vary significantly and involve long development periods. For example, it took several years to define protocols for the use of HD cameras in the diagnosis of certain dermatological conditions. When healthcare providers and specialist centers are investing in treating specific diseases, this increases the pressure to look for scale in rolling out new approaches.

We believe that this phenomenon will have a considerable impact on the adoption of video conferencing as it requires a much more joined-up deployment of services, and incorporates a greater range of endpoints to be connected. For example, a cancer network could involve connecting up a major hospital, GP surgeries, specialist care centers, and patients' homes within a certain geographical area simultaneously or over a short period of time. This outcome is a different pattern of deployment compared to the more gradual stages of adoption outlined in Figure 4. Figure 7 outlines how disease-specific video conferencing solutions need to work across a range of different locations to be effective.

Figure 7: Vertical deployment approach

Source: Ovum

OVUM

Mobility will be more important for professionals than patients

For audio and web conferencing, location is usually unimportant because audio and web endpoints (such as mobile phones and laptops) are portable, and participants are individuals. However, location is far more important for video calls because participants are often in groups and endpoints are not as portable. This also applies to doctor–patient video conferencing as it often involves patients in medical centers or their own homes.

However, with the increased mobility of healthcare professionals and greater collaboration between professionals in different locations, mobile video conferencing solutions for professional-to-professional communication is becoming increasingly important. This means that secure connections will need to be extended to a range of large-screen mobile devices, including smartphones, tablets, and laptops.

APPENDIX

Abbreviations

EHR	Electronic health record
ER	Emergency room
EU	European Union
FTTB	Fiber-to-the-business
FTTH	Fiber-to-the-home
GP	General practitioner
HD	High definition
HIPAA	Health Insurance Portability and Accountability Act
ICT	Information and communication technology
IP	Internet protocol
ISDN	Integrated services digital network
IT	Information technology
M&A	Merger and acquisition
NHS	National Health Service (UK)
PC	Personal computer
PHI	Protected health information
QoS	Quality of service
xDSL	Digital subscriber line

Methodology

- Primary research/vendor briefings: ongoing briefings with technology vendors serving the healthcare industry.
- Secondary research: industry publications, company annual reports, press releases, and data from public databases.
- Healthcare technology businesses: structured telephone-based interviews with IT decision makers at hospitals across North America, Western Europe, and Australia.
- Large-Enterprise Survey: Video Conferencing: structured telephone-based interviews with telecoms and IT decision makers in 14 hospitals across North America, Europe, and Asia-Pacific.

Further reading

2012 Trends to Watch: Healthcare Technology. OI00133-031 (October 2011)

Decision Matrix: Selecting a Telepresence Vendor. OT00082-001 (November 2011)

Healthcare IT Market Forecast Model. OI00147-030 (June 2011)

Healthcare IT Revenues Set to Grow. OI00133-002 (September 2011)

Healthcare Providers Guide to Telehealth (Best Practice Insights). BFCT2591 (June 2010)

Large-Enterprise Survey: Video Conferencing. OT00080-003 (June 2011)

The Enterprise Vertical Strategies of Major Telcos. OT00084-001 (April 2011)

The Future of Audio and Web Conferencing. OT00084-002 (January 2011)

The Future of Video Conferencing. OT00084-005 (April 2011)

“Video conferencing needs collaboration, but not dedicated collaboration environments”. OT00074-044 (December 2011)

Definitions

Video conferencing. For the purposes of this report, Ovum refers to video conferencing as a live transmission between two or more sites for the provision of healthcare. It is often supported by the use of diagnostic devices, and involves the secure transmission of the sounds and images needed

for the monitoring, diagnosis, treatment, and follow-up care of patients. It can take part between care providers only or between doctors and patients, and encompasses a range of different levels of service and usage. It includes situations where video is used as the medium of communication (immersive room solutions or dedicated video desktop units) and those where PC- and web-based solutions are offered as a managed service.

Immersive rooms. Immersive rooms are those designed specifically for video conferencing. This excludes rooms that are normally used for non-video conferencing purposes, and rooms that contain a video conferencing screen with no additional design.

Non-immersive room-based systems. Endpoints designed for multiple participants (meeting rooms) that are not used in immersive rooms.

Desktop conferencing devices. Endpoints designed primarily for video conferencing by a single person, commonly referred to as executive video desktops. Excludes devices that are primarily used for functions other than video conferencing, including PCs and mobile devices with video screens.

Web conferencing. Ovum defines web conferencing as a realtime, Internet-based activity where two or more participants share information and are able to communicate verbally with each other via an integrated VoIP connection or a separate phone line. Examples include Cisco WebEx and Microsoft LiveMeeting, but there are many other competing alternatives.

Audio conferencing. Ovum defines audio conferencing as a voice call conducted between at least two people using an externally hosted bridge to connect them. Audio conferencing is either automated or managed.

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