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the healthcare professional and is seen as a burden by her. Unlike in the US where Obamacare and the Insurance sector ensured near- 100 percent EMR, of the four categories considered here, this has seen the least adoption in our country." Paper records are maintained as a rule. Electronic Health Records, as opposed to mere EMR, are the integrated, portable form of health records. Scanned documents usually constitute EHR besides diagnostics reports available in e-form.

However, these systems present significant potential for growth in the coming years in India. Despite challenges in adoption, younger and middle-aged doctors are showing more interest in automation. The benefits of having a complete health record (out-patient, in-patient, occupational therapy, etc.) are now well understood. Additionally, the availability of clinical data on mobile devices has facilitated faster adoption. Many also prefer using speech-to-text, depending on individual comfort. Automating ICU charts, case histories, and discharge summaries have helped increase adoption rates. Providers are now becoming convinced of the availability of complete clinical data at the point of care.

According to **Dr Shashikant Pawar**, General Manager - Operations & Projects, Dr L H Hiranandani Hospital, Mumbai, although EMR/EHR systems have only partially been adopted by many private hospitals in India today, they adopt digital scanning of manual records. "Many hospitals adopt OPD-based standalone EMR and computerized prescription and order entry (CPOE). However, IPD EMR is generally adopted in a phased manner by hospitals, e.g., first in critical care areas and followed by wards. Since there are Electronic Health Record (EHR) Standards - 2016 for India in place, the evolution of the standardized products will lead to further acceptability and adoption by the government and private healthcare sector. Many state government hospitals have started using EMR, enhancing remote

healthcare delivery," he says.

As healthcare providers continue to recognize the value of digital medical records, we can expect to see more widespread adoption of these systems nationwide. Additionally, the Indian government has introduced initiatives such as National Digital Health Mission to encourage the adoption of EMR and EHR systems in India.

The future scope of EMR and EHR systems is promising. These systems can improve patient outcomes by providing healthcare providers with accurate and complete patient data. They can also reduce administrative tasks and streamline workflows, increasing efficiency and cost savings. With the increasing demand for digital healthcare solutions, the adoption rate of EMR and EHR systems is expected to rise significantly in the future.

Trends in EMR/EHR
Electronic Medical Records (EMRs) and Electronic Health Records (EHRs) have undergone significant advancements in recent years. One major advancement

Dr Shashikant Pawar, GM - Operations & Projects, Dr L H Hiranandani Hospital, Mumbai

Pradeep Saha, Chief Information Officer, Medica Group of Hospitals

Hospitals. He informs that all HIMS systems have strong data analytics capabilities today. "The Quality related factors have helped achieve a good level of care. Strong billing controls have been included. Technology has helped make PACS (DICOM) images part of all HIMS, where doctors can view the images, clinical notes, and lab reports. Medication errors are controlled with a well-defined drug administration that meticulously checks the five Rs - Right Patient, Right Drug, Right Dose, Right Route, and the Right Time. Institutes have seen a good control on the Consumables, which is a high cost," he describes.

4. Laboratory information management systems (LIMS)

The LIMS technology category is a critical component of healthcare systems worldwide. LIMS systems are designed to manage laboratory workflows, including sample tracking, data management, and result reporting. These systems can improve patient outcomes by providing healthcare providers with accurate and timely laboratory data. They can also improve efficiency and reduce costs by streamlining workflows and reducing administrative tasks.

Today, it is not just the results of pathology tests that matter. We need a trend analysis

of the results for continuity of care and accurate predictions. Care providers have to compare trends between multiple tests. An alert message goes to doctors for results with abnormal values. Patients need the results on their mobile devices and on WhatsApp, besides by email for printing. Doctors want to view them while providing medical advice. Since an automated LIMS can achieve all this, almost all institutes have invested in LIMS today. It is not a question of adoption today but rather how doctors, institutions, and patients are informed automatically to meet their requirements.

Trends in LIMS

Stating that LIMS lies at the center of most lab activities, Dr Shashikant Pawar of Dr L H Hiranandani Hospital observes, "Workflow management, specimen monitoring, data entry and reporting, regulatory enforcement assistance, code acquisition, interfacing with several other applications and equipment, archiving, inventory management and provision of billing information are its key features, which have resulted in acceptability for the adoption of LIMS for better efficiency and accuracy of the operations of the laboratory. However, majorly it is adopted by the hospitals where HMIS is also in use for better interoperability and avoids duplication of data entry."

While there has been a rise in the adoption of these foundational healthcare technologies, Dr Deepak Balani of Sakra also brings attention to an albeit risky development in this space. Several apps and fixes have mushroomed in this segment–one for each facet of patient care and hospital operations. "These supplement the core HIMS/ PACS, VNA, RIS, LIMS, and EMR. So much so that inter-operability is a challenge for the end user and IT support alike. The need of the hour is to develop an inter-operable, fully integrated, solid, user-friendly solution covering IT requirements," he warns.

As the demand for laboratory services
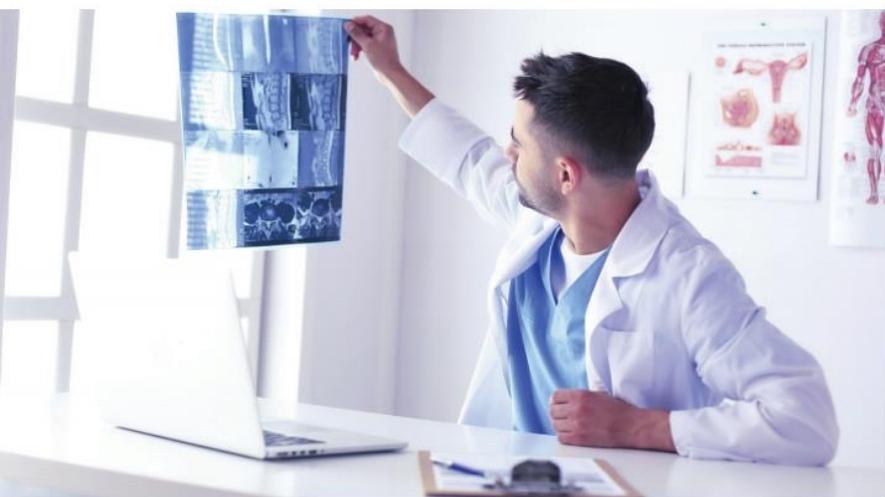
continues to grow in India, we expect to see more widespread adoption of LIMS systems in the coming years. The benefits of LIMS systems include improved accuracy, increased efficiency, and enhanced data management.

The cost-factor

According to Pradeep Saha of Medica, no value is bigger than saving patient lives. A correct implementation of core technologies, such as HIMS, EHR, and LIMS. PACS certainly bring down the mortality rates for healthcare organizations and thus prove valuable, he says. Providing a rough estimate, he informs that these solutions are available on a cloud-based OpEx model or on-premise CapEx model. The per-bed charges come to about Rs 15,000/- to Rs 25,000/- depending on various factors, including the size of the hospital, the vendor pricing, etc.

According to **Akshay Oleti**, Business Head, Fortis Hospitals, Bengaluru, the cost of acquiring and maintaining each solution can vary greatly depending on factors such as the healthcare organization, the complexity of the solution, and the vendor providing it. "Usually, the USA- and Europe-based technologies are much more expensive than those developed in India." He provides cost estimates in dollar terms for each technology solution group: "The cost of acquiring and maintaining an EMR/EHR system can range from a few thousand to several hundred

thousand dollars. PACS/VNA/RIS can range from a few thousand to several hundred thousand dollars. For HIMS, the costs may run into a few thousand to several hundred thousand dollars. Similarly, even for LIMS, the cost of acquiring and maintaining the system can range from a few thousand to several hundred thousand dollars."

Dr Shashikant Pawar of Dr L H Hiranandani Hospital provides investment estimates for all four technology categories in rupee terms. The acquisition cost of the EMR/EHR solution may range from Rs 80 lakh to Rs 1 crore (or above). For PACS, VNA, RIS, the investment ranges between Rs 50 lakh and Rs 70 lakh. HIMS solution may cost about Rs 3 crore to Rs 5 crore, and the LIMS system may require an investment of Rs 50 lakh to Rs 70 lakh, Dr Shashikant Pawar informs.

Commenting on the costs involved, Dr Poorva Nandedkar of MyHealthcare says that it is crucial to understand that only when we consider these technologies as-a-whole will they help us attain the required outcomes. "When we talk about patient data records, we include records from multiple sources, including when the patient is at home using a patient platform, during an out-patient consultation in the hospital, and recommendations that the consultant or doctor makes during consultations, whether they be tests, medications, advice for a procedure, or advice for admission. All of these recommendations are clinically