



Trends

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The Evolution of Medical Communications in the Hospital Campus Environment

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What is Medical Communications?



What first comes to mind when you hear the term *Medical Communications*? If your knowledge is limited on the subject, you would probably think of the nurse call system you may have observed while visiting a hospitalized friend or relative.

Medical Communications is so much more than simply providing a patient with the ability to call for a nurse. The term in its broader sense refers to “low voltage” systems that provide support for the clinical staff. It includes nurse call and physiological monitoring, but also may refer to non-clinical functions such as automated materials handling systems and master antenna TV systems. All these systems have some things in common and require a form of infrastructure within the hospital to support their operation.

Medical Communications Systems of the Past

Recent innovations in technology have revolutionized the field of Medical Communications. To help you better understand how Medical Communications function in a modern hospital environment, let’s take a look back at the past. In the late 1980’s, Medical Communications consisted of many discrete systems, all requiring their own dedicated data network to function. Direct wiring of terminals and printers required the computer system be located close to the user. Patient demographics were hosted on proprietary systems (Wang, Data General, etc). Diagnostic Imaging was all film with some small departmental servers (Novel).

Back then, “hard-wired” systems presented difficulties unheard of with today’s integrated systems. Pathology Departments used systems with direct hard wire connections to terminals, printers and laboratory instruments. Charges accumulated in this system were manually entered into the hospital system or billed separately. Physiological monitoring such as Spacelabs were maintained by Biomedical Engineering Departments with hard wired systems limited to departments or floors. Information had to be printed out and manually incorporated into the patient record along with lab results and physician notes. Patients requiring continuous monitoring would be disconnected, connected to portable units and reconnected when they got to their destination. Other than the printed data, there was no continuous record of vital patient information.

Nurse Call systems were separate “locally wired” systems with banks of switches located in the nursing stations. These manual systems were used to communicate back to patients and light hall indicators. Other miscellaneous systems were individually connected into

“stand alone” systems (networks), without the ability to share information. Data networks consisted of 4 megabit-per-second (Mbps), “ARCnet” and IBM’s “Token ring” networks. These networks connected small, departmental servers together with their PC’s. Running single function systems, such as storing patient demographics, were normally managed by the individual departments. These systems were wired out of local wiring closets and did not communicate with other systems.

As technology advanced, data networks started moving to 10Mbps Ethernet. PC’s were now called “Work Stations” as they moved from Personal Computer to a corporate asset and began running multiple hospital wide applications. Using “terminal emulation software” the workstations began being used in areas of the hospital normally served by directly connected terminals. Networked workstations were not required to be physically close to the hospital information systems, and thus began the push for consolidation into “Data Centers.” Diagnostic Imaging Departments, driven by high construction costs for film based (i.e. chemical) systems and a need for an electronic record, moved to digital systems. The HL7 ADT interface model was born, which describes how patient records are defined and allows the transfer of data between systems. The electronic patient record could now incorporate lab results, clinical notes, pharmacy orders and current billing.

Low voltage wiring within the physical plant or institution still consisted of many separate systems such as telephone, hospital wide data, departmental data, physiological monitoring, nurse call, and security. However, it was starting to move to common wiring closets on the floors and common pathways throughout the buildings.

Medical Communications Systems Today

Today’s high-speed data networks (10 Gigabit per second), allow large amounts of data to be moved around the campus

and more clinical data is being carried over hospital Local Area Networks (LAN’s). Diagnostic Imaging Departments have gone film-less where all “modalities” (X-ray, CT, MRI, etc.) are stored and reviewed digitally. Nurse Call Systems are fully integrated with other hospital systems to provide patient data, pocket paging and wireless phone interfaces. Physiological monitoring systems are still stand alone because of FDA requirements, but utilize standard networking components and common wiring to the patient’s “headwall.” Using wireless technologies, physiological monitoring, can record vital statistics from entry into the Emergency Department, through surgery, recovery, and up to discharge. Pharmacy systems can track physician’s orders for medications and distribution from remote pharmaceutical dispensers. Materials Management Systems track the use of consumables and order replacements. Robotic Systems travel the floors, delivering food and supplies while communicating with control systems using wireless technology.

All of this technology, and more, uses a common physical plant that is composed of fiber optic and copper cabling. Though some systems are still stand alone, they all utilize one physical cabling plant including the following: physiological monitoring, nurse call, telemetry, wireless phones, pocket alpha numeric pagers, wireless computers, security (cameras, doors, alarms, etc.), hospital data networks, telephones, medicine distribution systems, material distribution systems, building HVAC control systems.

What might the future of Medical Communications be in the twenty-first century? As new systems are installed and old systems are replaced, Medical Communication Systems will move to single networks with full integration, sharing of data, and utilization of a common horizontal wiring system (floors). This will allow any device, medical or not, to connect anywhere. As the acuity of patients change, hospitals will have the flexibility to change rooms and support areas without having to incur the costs of re-cabling.



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