Clinical Information Systems: Enterprise Versus Departmental Solutions in Obstetrics

The computer industry has not yet developed systems that incorporate specialized departmental functionality with standard CIS applications such as CPOE, clinical documentation, and automated medication administration records. Until integrated solutions are available, health care organizations need to carefully weigh the pros and cons of using departmental systems in conjunction with their enterprise clinical system.

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Clinical Information System Evolution
When clinical information system (CIS) vendors entered the marketplace, they had either an acute care (adult medical-surgical), critical care, or ambulatory focus for their initial product offering. Over time, many of these vendors were bought, sold, or acquired and evolved into the vendors that we know today (Cerner, Eclipsys, Epic, IDX, McKesson, Meditech, and Siemens). Most of the current vendors have products that they market as an electronic medical record (EMR) — an enterprise solution for health care organizations. While each of the vendors entered the marketplace with a narrowly focused product, over time each has expanded their product line to provide functionality for acute care inpatient, critical care, and the ambulatory setting. Developing their product functionality to accommodate the needs of the emergency department was the next logical step, which many of them have taken. Additionally, some of these vendors offer various products for other areas of the health care organization.

Departmental System Dilemma
At the core of an enterprise solution, CIS functionality is essential for basic clinical practice: physician order entry, clinical documentation, and the medication administration record. These three system components must be tightly integrated in order for the organization to achieve the greatest clinical benefit. While the majority of the health care organization’s needs are met with the solutions provided by the major CIS vendors, there are departments within the organization whose unique needs are not as well addressed. The gaps typically are related to the specialized devices that are used within these areas and integrating the data from these devices into the patient’s EMR.

Within the enterprise CIS, it is possible to build all of the needed orders for these departments, and most of the CIS vendors provide the capability to design and build data entry and review screens for use in these specialized departments (dialysis, cardiac catheterization lab, and obstetrics). The departments start to raise issues with the enterprise CIS because none of the CIS vendors currently have the device interfaces specific to their areas. When all of a department’s needs cannot be met by the enterprise CIS, the department frequently campaigns for permission to purchase a departmental system that was developed to meet their unique needs. At this point, a fundamental question arises: Even if it is possible to design and build something for these areas, is it in the best interest of the organization to do so?

Unique Department Needs: Obstetrics
All CIS vendors fall short of providing an integrated solution for the obstetrical area. During the sales cycle, the major CIS vendors will state that the documentation screens within their systems are all configurable and the vocabulary within the system is customer-defined. This means that they provide their clients the capability to build documentation data-entry screens using the vocabulary specific to obstetrics (ante-partum, labor, delivery, post partum, newborn nursery, and NICU). However, some key features are typically lacking from an enterprise solution CIS versus the department-specific obstetrical system, such as:

• Mother-baby link: The only medical history for a newborn infant is the maternal prenatal history and information related to what transpired during labor and delivery. A link between the mother’s chart and the infant’s chart allows maternal prenatal history, labor, and delivery information to

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automatically become part of the newborn record. The information documented within the maternal record needs to flow to the newborn record and become the newborn's medical history. Additionally, the maternal medical record number needs to be associated with that of the infant. This is not a simple 1:1 relationship, as multiple newborns in the case of multiple births may be associated with a single mother within a single encounter.

- **Friedman Curve/labor graph:** Over time the system automatically plots the progress of labor based on the values documented in the system for cervical dilation and station. This is a graph that requires two different scales along the "x" axis so that the progress of labor can be plotted over time. This graph is used as a predictor of success for the mother in labor.

- **Fetal monitoring strip documentation:** Pertinent documentation (specific data items) is captured within the medical record, but is also recorded directly on the fetal monitoring strip. This automatic double recording (not double documentation) replaces the need for the caregiver to write information on the paper fetal monitoring strip.

- **Fetal monitoring archival system:** This is the virtual storage of the fetal monitoring strip. These strips are done during antepartum testing (stress tests, non-stress tests) and observation, as well as during labor. A patient can be monitored intermittently or continuously for hours or even days, so the volume of information can run from minimal to voluminous. Since these strips are part of the medical record, they must be stored and must be retrievable for a maximum of 28 years (age of majority plus seven years), depending on state law.

**System Interfaces**

Another area for concern is the ability of the obstetrical system to interface to other systems within the organization. When talking with obstetrical system vendors, an organization must clearly ask the correct questions and have a complete understanding of the vendor’s response.

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- **Enterprise system**, so that lab results can be stored and viewed in the obstetrical system. This could mean that laboratory data are received and stored in two systems – the enterprise clinical system and the obstetrical system. This may mean that two laboratory interfaces must be developed and maintained by the health care organization’s IS department.

  - It must be clearly understood what information related to the obstetrical event will be sent from the obstetrical system to the enterprise clinical system and in what format. At the heart of the enterprise clinical system, there is usually a clinical data repository (CDR) that stores longitudinal patient data. If the obstetrical system does not pass information to the CDR, then all knowledge of any obstetrical events will be missing from a woman’s lifetime medical record. Since HL7 standards have not been released for clinical documentation data, it is highly unlikely that information documented within an obstetrical system can be passed as discrete data to an enterprise clinical system.

  - Most obstetrical systems are able to send the obstetrical data to the enterprise clinical system, but it is in the form of a document. This would be similar to the way that many organizations view radiology, pathology, or other scanned documents online. The obstetrical record could be viewed online, but the ability to have data such as vital signs come across and appear within an enterprise system vital-sign flow sheet (for data trending) would be lost. For the majority of obstetrical
cases, this is an acceptable solution. The exceptions are those cases that start as an obstetrical admission and become a medical-surgical or critical care in-patient event. Discrete data collected within the obstetrical record would not pass as discrete data to the enterprise clinical system; and the ability to trend data from the time the patient was admitted throughout their stay is lost.

**Obstetrical System Arguments**

While strong arguments can be made for doing all documentation within the enterprise clinical information system, there are also strong arguments that can be made for implementing a department specific clinical solution for obstetrics, including:

- One of the highest incidences of litigation is associated with obstetrics cases.
- The average award arising from litigation related to an obstetrical incident is $10 million.
- A lawsuit claiming damage to the infant stemming from an obstetrical incident can be filed until the age of majority plus seven years (depending on state law).
- It can be critical to an obstetrics case to have appropriate clinical documentation appear directly on the fetal monitoring strip.
- Obstetrical solutions (unlike enterprise solutions) usually come with standardized pre-formatted printed reports that provide the organization with the capability to print a nicely organized, legal medical record. (A paper chart that presents clinical documentation in a logical, easy-to-review format that can be given to someone outside of the organization as necessary.)
- Information sent to the infant’s medical record via the mother-baby link feature is more timely, legible, and complete.
- A fetal monitor archival system is something that is usually purchased by an organization that has a moderate-to-high volume of obstetrics cases.
- Often the obstetrical system solution includes physicians’ office documentation for prenatal information that can automatically pre-populate data fields needed for in-patient care. (The converse can also be true for data that are documented during the in-patient episode and are needed by the physician for post-partum follow-up.)
- Obstetrical systems that include NICU solutions usually have the interfaces already developed for those devices used in this specialized area. (Many of these devices are different from those used in adult critical care areas.)

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**Weighing the Choices**

Health care organizations need to carefully weigh the pros and cons of using departmental systems in conjunction with their enterprise clinical system. They need to clearly understand the benefits that a departmental system brings to the organization, as well as the limitations of these systems, especially in the area of exchanging data with enterprise solutions. There is not a clear-cut answer at this time. We can only hope that as enterprise clinical information systems solutions continue in their evolution, the major vendors will recognize the need and begin to incorporate the specialized functionality contained within departmental systems like those developed for obstetrics, dialysis, and cardiac catheterization lab, thus making these decisions easier for all.