MEDITECH EXPANSE

THE BENEFITS OF
An Integrated Approach to Critical Care

Executive Summary

Nearly half of all critical care unit (CCU) admissions are 65 years of age or older.[1] With an array of comorbidities, these patients require complex medication management and treatment protocols, which generate vast amounts of data in the EHR. The challenge for clinicians is to quickly review and interpret all of this clinical data in order to effectively diagnose and treat patients.

In addition, an estimated 50 percent of patients will suffer post-intensive care syndrome (PICS)—new or worsening cognitive, psychiatric, or physical function after a critical illness.[2] To address their needs and deliver whole-patient care in all settings, information from critical care must be shared enterprise-wide.

MEDITECH's Critical Care solution is designed for the workflow of this high acuity environment, incorporating data in a meaningful way so it is used to drive clinical decisions based on the right data, at the right time. And, with its full EHR integration—including rehabilitation, ambulatory, and home care settings—all providers have immediate access to the complete patient chart. Critical care clinicians may easily reference past information from other care areas and providers throughout the network—helping them to more effectively manage patients, both before and after discharge. This paper reviews the safety and efficiency benefits of MEDITECH's EHR-based approach to critical care.

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Critical Information When and Where You Need It

MEDITECH's Critical Care solution is tailored to the processes and workflows of this unique setting. It facilitates effective communication and supports the multidisciplinary care team working together to respond to unpredictable events and frequent interruptions. For the nurse who is constantly monitoring the patient and may be adjusting minute-to-minute titration of medications, the critical care flowsheet provides a centralized location to manage all aspects of the patient's care (see figure 1 below). Our solution is designed to render a tremendous amount of data in a meaningful and actionable way to aid nurses and physicians in assessing, monitoring, and treating the patient.

Working closely with critical care experts from more than three dozen healthcare organizations, MEDITECH has developed an integrated Critical Care solution that supports the distinct workflows found in these complex environments. Tested across a wide range of settings (including the ICU, NICU, and CCU), our solution enhances efficiency and safety. These improvements are the result of two key characteristics of the solution: (1) a fresh, modern design customized to the critical care environment; and (2) full integration with the enterprise EHR, providing immediate access to the complete patient chart for clinicians in critical care and providers elsewhere throughout the health system.

Qualitative Input on Critical Care Design

Customer Focus Groups

As part of MEDITECH's Agile software development process, approximately 36 customer organizations provided feedback during 10 focus group sessions conducted throughout the research, design, coding, and release phases. This ensured the new Critical Care solution had the flexibility necessary to support ICU processes while retaining its intuitiveness and ease of use.

Members of the focus groups participated in several rounds of software usability testing, navigating the new system without guidance and without documentation. Data collected during these usability tests (including time to complete tasks, errant clicks, and other data) were reviewed by the software development team, who made changes before subsequent tests.

Specific enhancements made as the result of focus group testing included improving the usability of the cumulative I&O tool and providing easier ways to identify statuses for infusions and titrations. A new weight-based cumulative calculator, of particular importance in the neonatal CCU setting, was added. The feedback provided from a broad cross-section of customers during the focus group phase significantly enhanced the core product.

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Fig. 1 — MEDITECH's Critical Care Flowsheet brings patient information together in a central location.

With our Critical Care solution, nurses can . . .

- View and document all patient data on a single, unified, interactive flowsheet
- Access lab results and images directly from the flowsheet for improved clinical decision support
- See time-sensitive data, such as new orders and tasks, at the top of the flowsheet
- Manage infused fluids and intake of titrated medications from the flowsheet
- Monitor and analyze historical and real-time trends and initiate best practice treatment protocols sooner for optimal outcomes
- Customize the display of data based on patient's condition and on clinical workflow
- Capture and annotate directly on cardiac waveforms
- Pull data from multiple monitors and ventilators simultaneously with robust monitor integration
- Enhance communication between clinicians with patient snapshot and bedside bulletin
- Select and view the patient's visits across the enterprise in one step
- Provide real-time views of data captured in the CCU to clinicians anywhere else in the network.

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EHR Integration Fosters Multidisciplinary Collaboration and Communication

EHR integration can help to facilitate safe and effective care transitions—especially for critically ill patients, who are often transferred multiple times along the continuum. Ideally each transition moves the patient down the acuity scale, but transitions present real challenges. If important data is missed or not readily accessible for all clinicians, the patient's condition might degrade and require closer monitoring, or even a return to the ICU.

Because MEDITECH's Critical Care solution is a component of the enterprise EHR, data from each care setting is available to clinicians along the entire continuum traveled by the patient. For example, a patient who enters the ED with severe shortness of breath might require oxygen titration, monitoring via pulse oximetry, IV fluids, several medications, and additional monitoring. When a bed is available, the patient may then be transferred from the ED to the ICU, where the nurse assigned the patient can observe and trend the data collected in the ED (including monitor output) directly on the flowsheet.

The critical care nurse can continue to use the flowsheet to monitor the patient and document interventions throughout their time in the ICU. Once the patient stabilizes and moves to the next level of care, the floor nurse can see exactly how the patient has progressed, by accessing cardiac waveforms and reviewing data from ventilators and hemodynamic monitors. The critical care nursing documentation is integrated directly into the floor nurses' worklist documentation (in MEDITECH's Patient Care and Patient Safety solution) allowing them to view it as they assess the patient. (See figure 2 below.)

Fig. 2 - Floor nurses documenting in the worklist are able to view data documented in Critical Care.

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The Critical Care Flowsheet also serves as a touchstone for coordination between nurses and physicians in the ICU. During multidisciplinary rounds or a follow up call from the attending physician, the nurse may use the flowsheet to provide an overview of the patient's condition. From the flowsheet, the nurse can drill down into pertinent details if questions are asked, or access the full patient chart to provide additional context.

Finally, since all data captured and tracked via the flowsheet becomes part of the patient record, providers anywhere in the organization can monitor the progress of their patients in the ICU. Some might simply want a high level summary of the episode after their patient is out of the unit. Others might want more details. A cardiologist, for example, could view the patient's flowsheet in real time, as monitor data is being recorded and ICU nurses are caring for the patient. The ability to remotely monitor critical care data can be used to support organizations that use an eICU model for overnight coverage.

Once the patient is discharged, providers have easy access to information—whether the patient is seen in the rehab, ambulatory, long term, or home care setting. MEDITECH's single, patient-centered electronic record automatically follows the patient wherever and whenever they are receiving care. Even when patients visit providers outside the network, our CCD Exchange Suite, Direct Messaging, and physician notifications ensure that everyone stays informed.

Integrated centralized scheduling—and providing patients with referrals and follow up appointments—facilitates better tracking of patients with post-intensive care syndrome. Organizations may provide education materials to ensure that patients fully understand the range of difficulties they may encounter after a critical illness. Through MEDITECH's secure, confidential Patient and Consumer Health Portal, your organization may engage with patients and their families. Patients become active participants in their own care, as they (or a designated family member) can conveniently review and update their own health records, manage appointments/prescription renewals, access discharge materials, and communicate with providers confidentially via secure messaging.

An integrated approach to care—one that makes critical care a key component of the EHR—ensures that effective communication occurs between providers both inside and outside the ICU. By enabling more multidisciplinary collaboration, critical care functionality also paves the way for smoother transitions and better patient outcomes.

Clinically Sophisticated Design

MEDITECH's Critical Care solution provides the nurse with easy access to review and act on both system generated data and external patient monitor data, all from within an intuitive workflow. This design increases nurse efficiency by improving the timeliness of care and enhancing clinical decision making.

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Enhancing Nursing Efficiency

The EHR enables nurses to manage the frequent interruptions that often come with treating critically ill patients. MEDITECH's Critical Care solution provides a central location for nurses to perform a myriad of tasks efficiently, while also directing their focus to next steps. With this interactive design, nurses can "live within the flowsheet," as Critical Care pushes real-time alerts for new orders, new results, and communications from other care providers to one central screen (see figure 1 above). In addition to documenting, they can pull data directly into the flowsheet from multiple monitors and hemodynamic equipment without losing data or interrupting workflow.

Lab results and imaging studies flow directly into the flowsheet, and are viewable alongside other relevant patient data providing the nurse with valuable clinical decision support (see figure 3 below). For example, when a new lab is resulted for a patient who has IV fluids with potassium running, it automatically appears on the flowsheet, enabling the nurse to quickly assess whether or not to stop the fluid. This streamlines workflow and helps nurses to make timely decisions.

Fig. 3 — Laboratory and imaging results populate the Critical Care Flowsheet.

> "It's really helpful to have lab results and imaging studies flow directly into the flowsheet, because it allows nurses to view this data alongside other patient data and provides nurses with valuable clinical decision support."

Alicia Brubaker MSN, RN, CCRN-K, Informatics Nurse, Valley Health System

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The flowsheet further streamlines nursing workflow by centralizing documentation of infused fluids and intake of titrated medications. Relevant information—such as the blood pressure and other hemodynamic measurements—displays on the screen, and can be viewed with the drip dosage/ volume as the nurse titrates drips, making it easier to decide when and how much to titrate (see figure 4 below). For patients on fluid restrictions, nurses can also easily view the patient's urine output within the same screen (as IV flowsheet/intake information) to help them decide when and how much to titrate drips and IV rates. In addition, critical information such as cumulative totals for the full length of stay is viewable in the flowsheet and immediately accessible to the nurse.

Fig. 4 — The nurse is able to document on IV medications right in the CCFS while viewing vital signs.

Integrating External Data

Clinicians in critical care settings have an enormous range of data to monitor, assess, and act upon. From standard vital signs, to end tidal carbon dioxide, urine output, ECG readings and beyond, the variety and volume of data can be daunting. MEDITECH's Critical Care solution helps clinicians with two vital tasks: pulling data from multiple monitors simultaneously into the flowsheet, and analyzing data through trending and graphing.

MEDITECH's Critical Care solution includes a cardiac waveform interface that enables clinicians to view, capture, and annotate cardiac waveforms directly within the flowsheet (see figure 5 below). Nurses can digitally record a strip, measure relevant intervals (using electronic calipers), and add their annotations in one place. When finished, an image of the strip along with the associated data are embedded

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onto the flowsheet, thus eliminating paper strips (which are typically printed, posted, and frequently, scanned). The flowsheet often eliminates the need for a separate ECG assessment documentation, since the ECG interval data is annotated directly on the waveform.

Fig. 5 — Nurses can view, capture, and annotate cardiac waveforms.
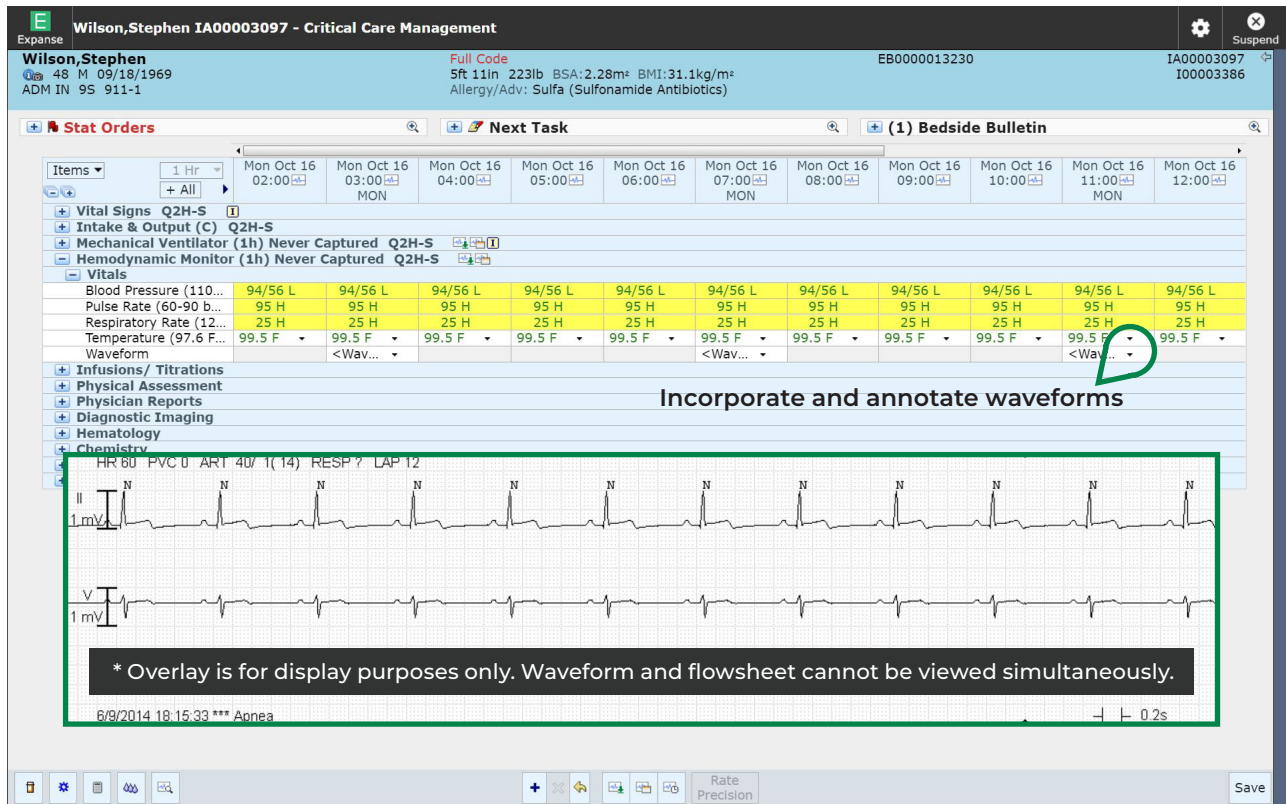
"MEDITECH's Critical Care solution allows nurses to capture and annotate directly on cardiac waveforms, as well as pull data from multiple monitors and hemodynamic equipment simultaneously with its robust monitor integration."

Alicia Brubaker MSN, RN, CCRN-K, Informatics Nurse, Valley Health System

Supporting Workflow Through Customization and Personalization

Our solution offers the flexibility to customize flowsheet content. For example, the flowsheet displayed for a middle-aged male patient on a cardiac unit will differ significantly from a pediatric female patient in the PICU. Furthermore, individual clinicians may personalize the flowsheet on-the-fly, based upon the patient's specific condition which may change throughout the visit. A clinician treating a trauma patient who develops sepsis, for instance, might want to view particular wound assessments alongside lab values and vital signs. Likewise, a full-term pregnant trauma patient admitted to the ICU could

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potentially deliver her baby while in the unit. The nurse can easily add and document on a Labor and Delivery (L&D) template while in the flowsheet. Clinicians may save the current state of the display so when they return to the patient's flowsheet, the specific items they've chosen will appear, expanded or collapsed just as they left them.

Another powerful tool for personalization places time-sensitive information directly at the top of the flowsheet. Relevant data from other parts of the chart—like newly entered medications—is pushed to widgets, minimizing the need for nurses to navigate from screen to screen to review relevant data (see figure 6 below). The nurse can then acknowledge medication orders directly from the flowsheet and immediately administer the medication, improving the timeliness of care delivery. Widgets have clear indicators that show when there are new items to review, and they can be expanded to view updated data before being collapsed again to resume work in the flowsheet. In this manner they call attention to important new information without interrupting workflow. For example, at The Valley Hospital a nurse was observed documenting directly on the flowsheet as the physician entered a stat order, and within five seconds of the order being placed, the nurse had already reviewed and acknowledged it.

Fig. 6 — Widgets display at the top of the flowsheet, pushing information such as new and unacknowledged orders to the nurse. Stat orders — regardless of where they rank based on order date/time — will always appear first on the list.

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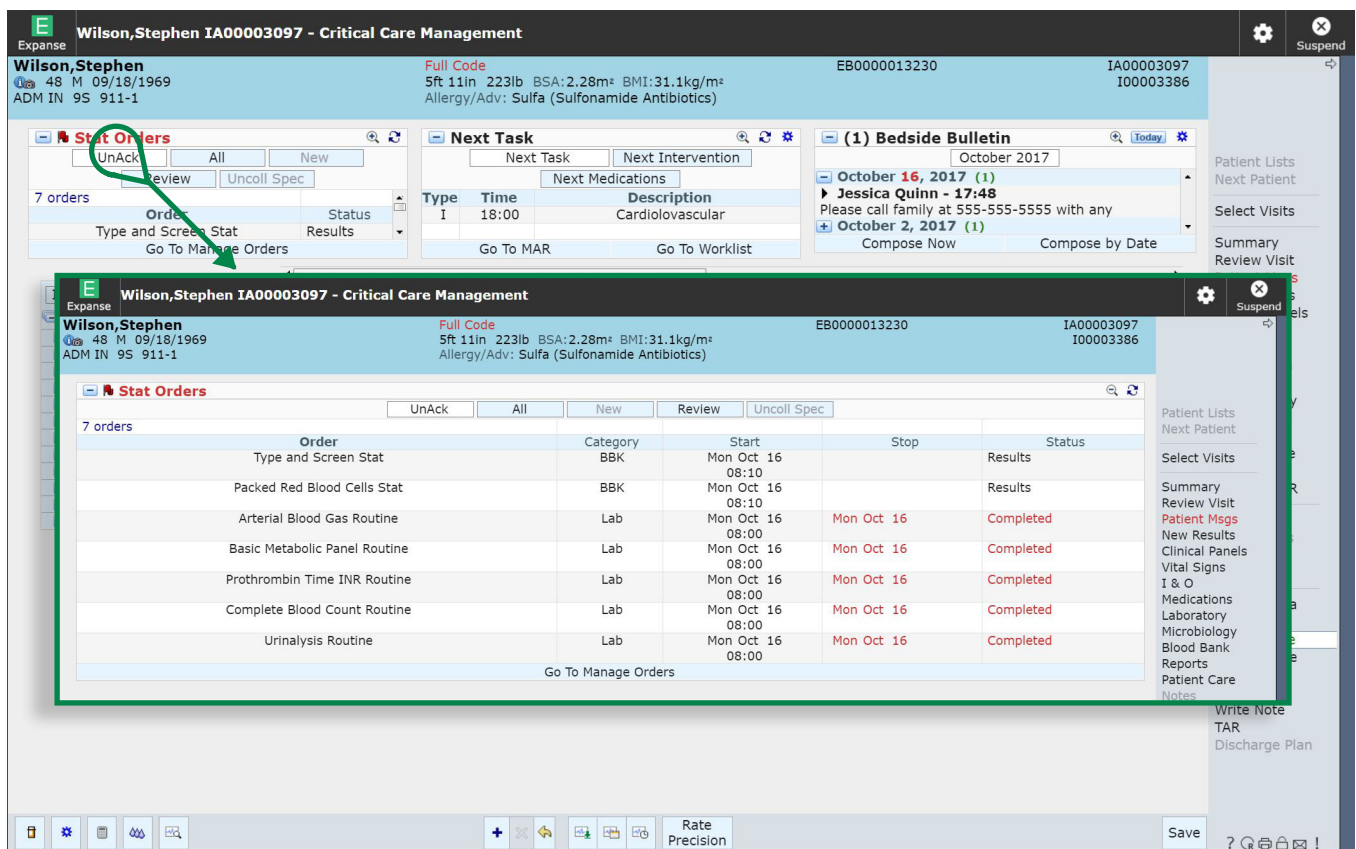
The flowsheet screen design enhances communication between clinicians, which is particularly valuable during shift changes. Nurses can easily see the patient's journey over a course of several days with a quick snapshot view. The Bedside Bulletin further enhances nurse-to-nurse communication by providing "sticky note" functionality, enabling nurses to pass on important information or reminders at the end of their shift.

Bringing It All Together

MEDITECH's Critical Care solution is a powerful tool with a user-centered and innovative design that provides easier navigation and better tools to nurses caring for critically ill patients. The power of the integrated EHR is what enables clinicians to "live in the flowsheet," as all of the data they need to act upon, and all of the data they collect, is brought together via a single user interface—enabling providers to streamline their workflow, detect trends, and make informed, timely decisions. Thus, the patient's care team has immediate access to his or her complete chart to formulate treatment plans and collaborate care. Developed and refined with practicing critical care specialists, MEDITECH's solution is a context-specific tool tailored to this unique environment.

References

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2. Society for Critical Care Medicine, Strategies to Ensure Long-Term Quality of Life in ICU Survivors, Managing Post-Intensive Care Syndrome in the ICU, Ramona O. Hopkins, PhD,, 2013 - 4 August. **http://www.sccm.org/ Communications/Critical-Connections/Archives/Pages/Strategies-Ensure-Quality-Life-Survivors.aspx accessed June 7, 2016**