CRITICAL CHANGES

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PHILIPS MAKES KEY ENHANCEMENTS TO ITS HEARTSTART MRX MONITOR/DEFIBRILLATOR

Over the last two decades, technological advancements have allowed EMS systems to increase their focus on diagnostic and therapeutic interventions in addition to transport considerations. Modern technologies now also allow EMS systems to communicate with receiving hospitals in real time.

In this article, I'll review several new enhancements available in the Philips HeartStart MRx monitor/defibrillator: the Acute Cardiac Ischemia-Time Insensitive Predictive Instrument (ACI-TIPI), the Thrombolytic Predictive Instrument (TPI) and Connected Care Data Management solution systems.

ACI-TIPI

Acute cardiac ischemia (ACI) refers to a range of important cardiac conditions, including unstable angina (UA), non-ST elevation myocardial infarction (NSTEMI) and ST elevation infarction (STEMI), that greatly benefit from prehospital intervention. The timely and accurate diagnosis of ACI remains a challenge in EMS and in the ED. To improve ED triage accuracy, Selker, et al, developed and validated an ACI predictive instrument, which was eventually incorporated into the computerized electrocardiograph.[1]

Using a 0–100% probability based on characteristics of the 12-lead ECG and several clinical factors, the ACI-TIPI software tool indicates whether a patient is truly suffering from ACI and enhances the analysis capabilities of the MRx (see Figure 1). This probability is generated on the basis of four clinical variables (age, gender, presence or absence of chest pain, and whether chest pain is the most important presenting symptom) and three ECG variables (presence or absence of pathological or significant Q waves, presence/degree of ST-segment elevation or depression and presence/degree of T-wave elevation or inversion). The ECG features must be present in at least two contiguous leads and must not be caused by exclusionary conditions (bundle branch blocks, early repolarization, ventricular hypertrophy, pacemakers) known to be associated with secondary ST and T changes.

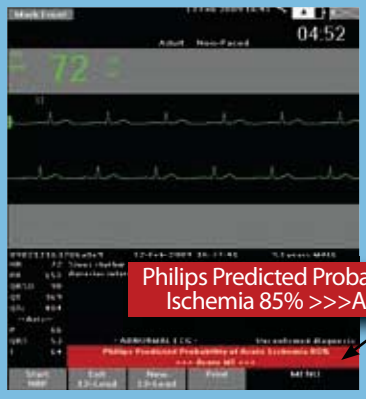

Figure 1: Using a 0–100% probability on the 12-lead ECG, the ACI-TIPI software tool enhances the analysis capabilities of the MRx by indicating whether a patient is truly suffering from ACI.

In a large multicenter trial, ACI-TIPI was shown to improve the ED triage of chest pain patients by decreasing unnecessary hospital and Coronary Care Unit admissions.[2] Aufderheide, et al, have also confirmed the accuracy of ACI-TIPI in the prehospital setting.[3]

Although further studies are needed, ACI-TIPI could be incorporated within EMS systems in several ways. The tool could facilitate triage and transport decisions between ALS/BLS units in tiered EMS systems and help guide diagnostic considerations and therapies (aspirin, nitroglycerin, beta-blockers, etc.) in patients.[3] In fact, an ACI-TIPI probability of ≥75% is currently an inclusion criteria for the IMMEDIATE trial, which is testing whether prehospital use of intravenous glucose, insulin and potassium can improve the outcomes of patients having heart attack symptoms.[4]

Although most EMS ACS triage systems have focused on the triage of STEMI, ACI-TIPI could also be used to identify individuals with UA and NSTEMI who might benefit from triage directly to cardiac-catherization-capable facilities.

Finally, ACI-TIPI may assist ALS providers in their decision-making and risk communication when dealing with patients who are reluctant to be transported to the hospital or simply don't need to be transported.

TPI

Early use of thrombolytic therapy (within 70 minutes of symptom onset) has been shown to minimize infarct size and complications in STEMI.[5]

The Philips Thrombolytic Predictive Instrument (TPI) is a software tool that generates a predicted probability score of outcome (0–100%) for STEMI patients with or without thrombolytic therapy based on four ECG features and seven patient clinical and demographic variables. Most of these features are the same or similar to those used with ACI-TIPI with the

same caveats in regard to exclusionary conditions.

In a multi-center ED trial, TPI increased both the use and timeliness of thrombolytic therapy.[6] TPI is ideal for use in 12-lead-capable EMS systems with longer transport times where it could potentially be used in conjunction with a checklist to administer thrombolytic therapy in the field.[7] TPI can also be used to enhance hospital readiness for receiving hospitals without cardiac catherization capabilities.

Figure 2: Wireless capabilities of the Philips HeartStart MRx monitor/defibrillator.
(GE MUSE is a registered trademark of GE Healthcare. OnBoard Mobile Gateway is a registered trademark of In Motion Technology.)

Critical Care Data Transmission Solutions

The expanded use of diagnostics within EMS has also led to the need to share clinical information with receiving hospitals in real time so that they can be better prepared to receive patients and provide remote guidance for patient care in the field. A variety of wireless and wired informatics solutions are currently available within the MRx, and these information data-sharing options are being continually refined and upgraded. Periodic Clinical Data Transmission uses Bluetooth wireless technology for periodic transmission of vital signs and 12-lead ECGs (see Figure 2).

Wireless transmission of prehospital 12-lead ECGs directly to the attending cardiologist's handheld computer has been shown to markedly reduce time to reperfusion in STEMI.[8] Transmitting and linking the clinical data collected within the MRx with an electronic patient care report (ePCR) is also important. The MRx now offers both wireless and wired solutions. Bluetooth wireless is sufficient for most clinical encounters, but larger files, such as those associated with the Q-CPR feature, are more efficiently transferred using a batch data transfer through a fast local area network (LAN) connection to a computer running software that communicates directly with the ePCR. The Batch/LAN Data Transfer option also provides an efficient flow for users who transfer patient data in batches at the end of a shift.

Summary

New software and data transmission enhancements within the MRx should help EMS systems in their efforts to deliver better care, share data with receiving hospitals and assist with post-event data management.

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