

STANDARDIZATION OF SOFTWARE LEVELS, DATEX RECORD INTERFACE LEVELS AND OUTPUTS INTERFACE LEVELS OF DATEX-OHMEDA S/5Ä MONITORS FOR IMPLEMENTING ELECTRONIC ANESTHESIA RECORDS AND ITS COST IMPLICATIONS

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The University of Iowa recently went live with electronic anesthesia records by EPIC systems. At our hospital we have different generations of GE/Datex-Ohmeda anesthesia machines, with different generations of Datex-Ohmeda S/5ä monitors attached to them. The output of these is RS-232. The Capsule device, Neuronâ, translates these data streams into TCP/IP and sends them over the hospital Ethernet backbone to the Capsule server. This server then translates the data streams to HL-7 and sends them through the Cloverleaf data switch to Epic. During the process of testing the integration of data from these machines and monitors to EPIC electronic anesthesia records, it was identified that these different generations of monitors had various versions of software, firmware and output levels. This could cause issues not only in the initial data validation and for downtime situations, but also would need more resources assigned for future updates and maintenance. Both the Department of Anesthesia and the Hospital Information Systems department were concerned about this. One example of problems with data flow was, older versions of S/5 monitor will not transmit entropy and NMT data into EPIC even though we could do real time monitoring, unless it was a certain level of Datex Record Interface level.

We found that for our S5 monitors there were 4 different software versions (ANE 03,05,06,07), 3 different Datex Record Interface (DRI) levels (2001,2003,2005) and 4 different Serial Output Interface levels. The estimated total cost of upgrading all these machines and monitors to the latest Software, DRI and Output levels came to around 150,000 USD. Extensive research and consultation with the GE engineers in Helsinki identified that the data output from the S/5 monitors was decided primarily by the DRI and the Output interface levels, as long as the software version was to a certain level. Apart from 4 very old monitors, all the other monitors with various software levels could be either dialed up or down to achieve a standard DRI (2003) and Output levels (8/9) by the local GE team. This meant that we had to upgrade the software levels of just 4 machines to the latest software (ANE07) version and then could standardize the Output and DRI levels of all monitors by dialing them up or down. This dropped our cost of this upgrade from the initial estimate of 150,000 USD to around 10,000 USD. This included the cost of upgrading our central server that the department of anesthesia uses to see waveform fields from different monitors in real-time, so that it is compatible with the new DRI levels.

Since data from our Anesthesia Machines (ADU/Aespire/Aestiva) were either minimal or not digital, we did not upgrade or change any of the software or firmware versions of these Anesthesia Machines.

Any department that is in the process of transitioning from paper to electronic should consider these factors as well and should provide adequate time and resources to make sure that these kind of issues are taken care of before go-live