# iMDsoft®

# CRITICAL CARE AUTOMATION
## EVIDENCE-BASED RESULTS

When it comes to healthcare IT expenditure, tight budgets and increasing capital needs mean that hospital executives are forced to make tough decisions about where to invest. In the ICU, even modest optimisations in performance have the potential to result in tremendous clinical and financial benefits. Critical care clinical information systems (CIS) create accessible, complete medical records that inform clinicians and support their decision-making throughout the care process. The implementation of a CIS in the ICU delivers operational improvements that make it easier for clinicians to work effectively, resulting in better patient care and increased staff satisfaction.

This white paper examines the value of critical care clinical information systems, as illustrated by peer-reviewed academic studies published by users of MetaVision from iMDsoft. It includes results in the areas of:

1. Automated documentation and communication
2. Clinical outcomes
3. Financial performance
4. Research
5. Strategic positioning

# IMPROVED DOCUMENTATION & COMMUNICATION

## REDUCED ERRORS

An automated clinical information system reduces errors caused by poor information management, including lost, inaccurate and illegible data. Additionally, a comprehensive digital critical care record reduces mistakes from miscalculations, and simplifies sign-out, transfer, and other complex workflows. A study performed at Papworth Hospital in the UK based on MetaVision found that, "All errors of completeness were abolished following implementation. The computerised system led to a significant improvement in prescribing safety, in a clinical area previously highlighted as having high rate of adverse drug errors. Legibility, completeness and traceability are no longer possible sources of medication errors *(Anaesthesia, 2010)*."

## ONE SINGLE RECORD FOR ALL DISCIPLINES

Clinical information systems improve communications for caregivers both within and outside of the ICU. Nurses, physicians, respiratory therapists and others can see the specific patient information that they need.

## REDUCED DOCUMENTATION AND REPORTING TIME

Automating information capture and export allows healthcare professionals to focus less on paperwork and more on care delivery. The impact of this can be astounding: OLVG hospital in the Netherlands showed that MetaVision can save 29 minutes of documentation time per eight-hour nursing shift that could then be reinvested in patient care *(Intensive Care Medicine, 2003)*. Another impressive result was documented by Lehigh Valley Health Network in the US: the network was able to save 95 minutes per 12-hour shift on nursing documentation *(AtlantiCare 8th Annual Trauma Symposium, May 2006)*.

### BROOMFIELD HOSPITAL, UK

"The other big change for us really is a multi-disciplinary approach. We have significant input to burn patients every day from intensivists, from burn surgeons, from physiotherapists, dieticians, psychotherapists, and trying to communicate amongst such a diverse group of people in the hospital was traditionally very difficult. With all the notes, the drugs, the communications in one place, we all know where to look to find what each professional group thought."

Dr. Steve Oakey
Clinical Director, Burns ICU

### WEST SUFFOLK HOSPITAL, UK

"Before we had the ICNARC/CCMDS module, all data was collected on paper, and I was reliant on nursing and medical staff for manually completing the forms. The module now extracts this data out of MetaVision for me. When I export the data each month, I can identify errors and see warnings which highlight missing or incorrect information. It has certainly made my job much easier."

Sheila Goodman
Audit and Research Sister, Critical Care

# CLINICAL OUTCOMES

## PREVENTION OF MALNUTRITION

Malnutrition in ICU patients is a serious concern, associated with increased infectious morbidity, prolonged hospital stay, and increased mortality. The use of MetaVision improves nutritional support through easy visualisation of the nutritional intervention and prescription standardisation. At the University Hospital of Lausanne in Switzerland, MetaVision facilitated a mean increase of energy delivery by 415 calories per day in all patients (Neonatal Intensive Care, 2011). A study performed at VU University Medical Centre in the Netherlands found that the percentage of patients reaching the goal for early and adequate nutritional support as defined by the Netherlands Health Care Inspectorate rose from 30.2% to 56.5% after implementing MetaVision *(The Netherlands Journal of Medicine, 2009).*

## BLOOD GLUCOSE CONTROL

OLVG hospital in the Netherlands increased the timeliness of administration of glycaemic control protocols from 35.5% to 40.2% and adherence to insulin dose guidelines from 64.2% to 77.3% using MetaVision (*Journal of the American Medical Informatics Association, 2005*). A study at Universitaire Ziekenhuizen Leuven assessed the impact of a blood glucose (BG) alert generated by MetaVision on tight glycaemic control (TGC) in the ICU. The study found that the alert was able to further improve the quality of BG control, as shown by a reduced mean BG per patient, a lower glycaemic penalty index and hyperglycaemic index, and a lower number of patients with hyperglycaemia, without increasing the need for blood sampling *(Intensive Care Medicine, 2011).*

## INCREASED ENFORCEMENT OF BEST PRACTICES

Many hospitals turn to clinical information systems in order to implement protocols. Advanced ICU systems offer a comprehensive clinical record and employ rule-based decision support that reveals hidden insights into the data. Schneider Children's Medical Center in Israel reported a 72% reduction in adverse drug events and a medication prescription error rate of 0.7% after using MetaVision's clinical decision support tools to limit doses by weight in their PICU *(Pediatrics, 2009).*

### UNIVERSITY HOSPITAL OF LAUSANNE, SWITZERLAND

"This holistic view of the patient improves treatment integration as well as patient safety and treatment accuracy. MetaVision has made nutrition information visible to nurses and clinicians, enabling anticipation of nutrient delivery and preventing the build-up of energy deficit."

**Pr. Mette M. Berger**
Service of Adult Critical Care Medicine

### SHEBA MEDICAL CENTER, ISRAEL

"We utilise an event which notifies clinicians of a reduction in saturation of greater than 6% which is sustained for more than 5 minutes. This was triggered, and led to a diagnostic attempt for the patient's hypoxemia. This case demonstrates the potential user of monitors of subtle changes in physiological parameters as an important indicator of significant clinical situations."

**Dr. Eran Segal**

## REDUCED LENGTH OF STAY

A relationship has been found between the implementation of CIS in critical care units and shortened length of stay. Reduction in medical errors, improved protocol compliance and the associated reduced complication rates are some of the care improvements that lead to this outcome. Paul Brousse Hospital in France found that using MetaVision as their clinical information system resulted in a 20% reduction in length of stay. A study published by the hospital states, "We believe that the clinically relevant differences concerning the length of stay in our ICU resulted from an improved quality of care following the implementation of ICIS [sic] *(Journal of Clinical Monitoring and Computing, 2014)*."

# FINANCIAL GAINS

## INCREASED REIMBURSEMENT

Constant demands on clinician time, coupled with complicated billing rules, make ICU revenue maximisation challenging. Different providers experience great variations in reimbursement levels, even when the patient mix, acuity, and level of care provided are all the same. Many hospitals have found that implementation of a clinical information system for critical care has led to an increase in total billable events and average DRG weightings. Paul Brousse Hospital in France reported a 99% reduction in loss of annual ICU financial supplements, from €194,139 to only €1628, with the introduction of MetaVision *(International Journal of Medical Informatics, 2013)*.

## DRUG COST SAVINGS

Despite the hefty initial capital investment required for a critical care CIS, these systems provide a quick return on investment that justifies their cost. Papworth Hospital in the UK saw drug costs drop from £110.16 per patient pre-implementation to £76.74 per patient post-implementation of MetaVision. L'Institut Paoli-Calmettes in France, another iMDsoft customer, reduced antibiotics-related expenses by 20%.

SYDNEY ADVENTIST
HOSPITAL, AUSTRALIA

"MetaVision has made a huge difference in how we work. Legible, accurate patient files can be seen at any workstation by multiple caregivers simultaneously. The online ordering system enables specialists to access the system remotely and send messages to the staff. The coding and billing processes are much easier, and of course, getting more money back faster is a major advantage."

**Arash Oskooi**
Service of Adult Critical Care Medicine

## REDUCED COMPLICATIONS AS A RESULT OF PROTOCOL COMPLIANCE

In the ICU, less than 20% of patients account for over half of total expenditure. Effective management of these "outliers", most of whom are characterised by one or more preventable complications, can dramatically improve cost-performance. Peer-reviewed literature demonstrates that care protocols can both reduce complication rates, most notably ventilator-acquired pneumonia (VAP) and sepsis, and improve recovery time via aggressive vent-weaning and glycaemic control.

Each of these protocols can translate into millions of dollars of annual savings for the institution implementing them. MetaVision customers report significant improvements in protocol compliance as a result of smart notifications about deviations from protocols. These notifications enable early intervention and help prevent costly complications.

# MORE EFFECTIVE RESEARCH

Clinicians can use the extensive data provided by critical care CIS to produce academic studies. More than 85 research papers have been published using MetaVision, on topics such as clinical improvements, cost analysis and quality measurements. Prestigious journals such as Archives of Internal Medicine and The New England Journal of Medicine feature studies based on MetaVision data. The Belgian multi-center EPaNIC study, "Early versus Late Parenteral Nutrition in Critically Ill Adults," used MetaVision to assist researchers in managing the nutritional needs of critically ill patients, and found that late parenteral nutrition was associated with fewer infections, enhanced recovery, and lower health care costs *(The New England Journal of Medicine, 2011)*. Based on data gathered by MetaVision, University Hospital of Lausanne in Switzerland has now published more than twelve papers in international journals, resulting in improved care quality.

BRIGHTON & SUSSEX UNIVERSITY HOSPITALS, UK

"The implementation of MetaVision in our NICU has improved the accuracy and quality of clinical notes, helping us to quickly review complex patients. Ongoing adaptation of the system is easy, facilitating our ability to meet specific research and audit needs."

**Dr. Philip Amess**
Clinical Lead for Neonatology

With the growing number of implementations of electronic health records, big data provides unprecedented opportunities for generating knowledge that can lead to clinical improvements and research. Patients, clinicians, administrators, researchers, and policy makers can all benefit from the wealth of healthcare information that is now easily accessible. As the critical care clinical information system for both UZ Leuven and UZAntwerp, MetaVision is an integral part of the Multi-centric Academic Tool for Research in Intensive Care (Matric) project.

This initiative is a collaboration of the three largest university hospitals in Flanders: UZ Leuven, UZAntwerp and UZ Ghent. These hospitals are working together to create an inter-university database with high-quality and related data from all the patients admitted to their ICUs. In addition to improving the quality and quantity of research, this centralised ICU database will get the critical patient cohorts needed for studies (about 9000 patients yearly) and will increase exposure for the healthcare achievements of the Flanders region to the world at large.

# ENHANCED STRATEGIC POSITIONING

Hospitals today must compete not only for patients, but for the most qualified and talented care givers and researchers. At the same time, quality initiatives and reporting requirements continue to grow in importance. Nowhere in the hospital are these trends more transformative than in critical care.

Critical care nursing shortages continue to plague many local markets, and similar shortages exist for pharmacists, respiratory therapists, and other specially trained providers. However, hospitals have found a strong correlation between increased professional satisfaction and reduced nursing turnover and vacancy rates. Clinical information systems that reduce documentation time and raise care quality have been shown to increase job satisfaction and directly improve nurse recruiting.

Attracting the best intensivists represents an equally challenging problem. Hospitals that effectively extend the reach of these scarce physicians, and that offer an environment with a high quality of life, will be the winners in this competition for talent.

The use of MetaVision serves as a compelling incentive for this valuable talent. A voluntary online survey sent to the ICU nurses at Macquarie University Hospital in Australia revealed that the nurses felt that MetaVision enhances time management, enables them to spend less time charting and more time with patients, and reduces medication errors *(Australian Critical Care, 2013)*.

LEHIGH VALLEY HEALTH NETWORK, US

"…Once these systems are installed they enhance staff satisfaction. It creates a certain wow factor. We have found that it's an important tool for recruitment, and that people who come through and see our practice understand that our facility has the resources to provide this kind of support to them, that the system manifests our commitment to patient safety and accurate documentation which impresses them, and that helps with our recruiting efforts."

**Dr. Thomas M. McLoughlin, Jr.**

# WHAT ONLY
# METAVISION
## BRINGS TO THE ICU

iMDsoft and the MetaVision clinical information system offers the following unique advantages for the ICU:

## DECADES OF EXPERIENCE IN CRITICAL CARE

MetaVision is designed to meet the clinical needs of ICUs. The system has been successfully implemented in general, paediatric, neonatal, and specialty intensive care units in over 350 hospitals in 24 countries.

## SUCCESSFUL MULTI-SITE PROJECTS

MetaVision's unique architecture enables efficient software deployments across large regions. Networks can maintain standardisation and enforce best practices across multiple sites while preserving individuality at the site level. iMDsoft has state and network-wide sales in Australia, Canada, Denmark, Norway, Sweden, Austria and the US.

## HIGH LEVEL OF CONFIGURABILITY

MetaVision is extremely adaptable, ensuring support for optimum workflow. New processes can be incorporated at any point without additional development, reducing total cost of ownership. Changes can be made at any level: for a specific workflow, a particular unit, hospital-wide or network-wide.

## POWERFUL DECISION SUPPORT

MetaVision provides powerful decision support tools that continually scan the entire patient record to prospectively detect health deteriorations, gaps in care and potential errors. In some ICUs today, MetaVision automatically evaluates 20 different data elements every minute to ensure patient safety.

## ADVANCED INTEROPERABILITY

MetaVision aggregates all the relevant clinical information and displays it all in one place. It integrates seamlessly with all major Hospital Information Systems (HIS): ADT, Labs, CPOE, drug cabinets, archive, scheduling, PACS, LDAP, coding and more. The MetaVision library of interfaces contains over 250 medical devices.

### ABOUT IMDSOFT

iMDsoft is a leading provider of Clinical Information Systems for critical, perioperative, and acute care environments. The company's flagship family of solutions, the MetaVision Suite, was first implemented in 1999. MetaVision generates comprehensive and accurate electronic medical records, and offers advanced decision support and medication management. Hospitals and health networks worldwide use MetaVision to improve care quality and enhance financial results. The system promotes compliance with protocols and best practices, streamlines reporting and supports clinical research.

www.imd-soft.com | info@imd-soft.com

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