GE Healthcare

Improving Access to Quality Critical Care Services in a Tier 3 Town of Northern India

- *Kainos Hospital, Haryana*

Revolutionizing Critical Care Infrastructure with The Centricity™ High Acuity Critical Care Solution

Study conducted on behalf of Wipro GE Healthcare Pvt. Ltd. By Ethnographic Medical Research Group (EMeRG) | www.emerg-inc.com

Marked by sustained economic growth over the past two decades, India's critical care infrastructure has improved significantly. However, availability of quality critical care services continues to be disparate. While the exact number of intensive care unit (ICU) beds in the country remains unknown, the global norm of maintaining one ICU bed per ten hospital beds has been a challenging proposition in India[1]. This is mainly attributed to the high cost of managing optimal standard of care including nurse to patient ratio, equipment and robust infrastructure.

"The intensive care units at private hospitals in small towns typically have lower standards thus begetting high mortality rate. The main challenge is lack of awareness among hospital management around ICU being a high-end super specialty. The department ideally should have strict and consistent protocols and efficient workflow."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

With critical care at the crux of its services, Kainos Hospital with more than 30 specialties was incepted in 2016. Spiraling cost of private hospitals in the region along with the need for improved specialty services including critical care, formed the core of the hospital's genesis. With over 10 years of experience in spearheading ICUs at leading hospitals in the UK, Dr. Aravind Dahiya and his team continuously strive to bring international standards of high acuity care to the region.

While pioneering digitalization of critical care services in the region, the hospital has been facilitating access to revolutionary equipment and software in the segment. Equipped with the Centricity™ – High Acuity Critical Care patient management solution, the hospital strives to raise the bar of clinical excellence.

"Considering the disease burden, for a population of 100,000, about 70 ICU beds may be needed. Thus, for 50 to 60 lakh population, we will need at least above 400 to 500 beds. In this district, if we consider the government sector, we have around 50 ICU beds, and in other sectors we have around 100 more. With just about 150 beds, still there is a deficiency of 200 to 300 beds."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

Challenges of maintaining an ICU in India

In a recent survey conducted by Kartik et al. across few ICU settings in the country, staffing parameter was observed to be a key improvement area.[2] Infection control and prevalence of sepsis remain some of the serious challenges faced by ICUs in the country. As per a study by the Indian Society of Critical Care Medicine, 36 Indians die every hour from sepsis.[3] The study, which was conducted on 4,209 patients in 124 ICUs across the nation demonstrated that even the patients admitted to ICUs for non-surgical treatment face a great risk of contracting sepsis.[3]

With an aspiration of improving the survival rate for critically ill patients in Haryana while managing high patient load, the hospital in early 2017 deployed Centricity™ High Acuity Critical Care solution.

Key challenges while directing critical care services in India[8]

- Burnout syndrome and retention of nursing staff
- Unforeseeable and unpredictable situations
- Medical errors due to miscommunication or lack of communication
- Variability and lack of adherence to protocols
- Balancing cost to the patients and provision of quality critical care services

"While we have been ensuring good standard of care since inception, for us the paramount challenge was unpredictable circumstances. Post-monsoon there is a sudden surge in vector-borne diseases such as Dengue, Chikungunya, Malaria, etc. Managing a sudden influx of patients without impacting the standard of care in ICU was critical for us."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

The Centricity™ High Acuity Critical Care – Optimizing workflow, Improving outcomes

Ever since the deployment, the ICU at Kainos Hospital has demonstrated lower crude mortality ratio. The crude mortality ratio# in the year 2017* was reported to be 13.32%; it further reduced to 7.11% in the succeeding year*,[10]. In the first six months of the hospital's inception, more than 70% of end-stage patients survived thereby elevating hospital's reputation.[9] This has in turn resulted in the referrals to the hospital increasing significantly.

What is Centricity™ High Acuity Critical Care?

A digital ICU management solution, Centricity™ High Acuity Critical Care is an integrated suite with user-friendly features that provides proven strategies to help healthcare providers improve quality of care, reduce risk of errors, optimize time and better manage costs in the Intensive Care Unit (ICU). With its automatic charting of vital signs and pre-loaded ICU protocols, the solution aids in improving operational efficiency.

** period considered for the analysis – January to December 2017 versus the same months in 2018*

 # Crude mortality Ratio= number of deaths divided by number of ICU admissions

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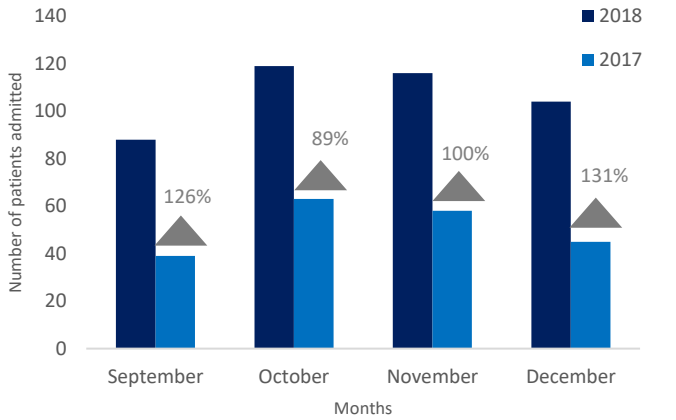
At >100%, the number of ICU admissions showcased an unprecedented growth in 2018 as compared to the previous year.[10] While the length of stay has reduced, ICU bed occupancy has been increasing. From just over 50% in 2017, the ICU bed occupancy currently stands at ~70%.[10]

Trend of admissions in ICU post deployment of Centricity™ High Acuity Critical Care [10]



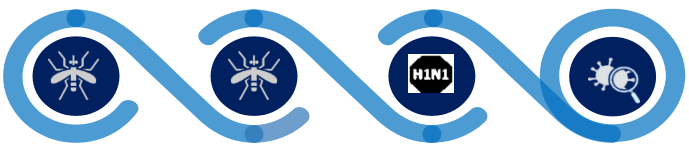
Managing unforeseen ICU capacity challenges:

The state of Haryana has been combatting a dual disease burden of communicable as well as non-communicable diseases. At 20%, the percentage of years of life lost (YLLs) due to ischemic heart diseases in Haryana continues to be high. Furthermore, seasonal increase in infectious diseases has been demanding. Between January 2019 to February 2019, Haryana reported most positive number of swine flu cases in the country (653 as compared to 61 in 2018). Rohtak alone accounted for 97 cases and one death during the same period.

High burden of Infectious Diseases warranting adequate Critical Care Services in Haryana

2018: 3,154 cases of malaria reported[4]

>650 reported cases of swine flu until February 2019[6]

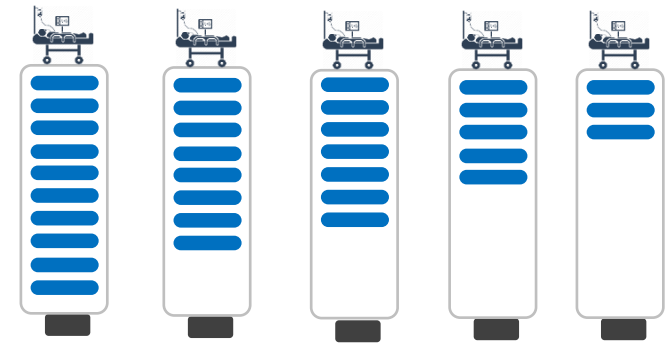


2018: **1,558** cases of dengue reported[5]

Hospitalization rate (HR) due to infectious diseases was **11.83 higher** than due to cardiovascular diseases[7]

Considering the multitudinous disease burden and sudden surge in ICU admissions during the specified months, progressively increasing ICU infrastructure promptly was cited to be unachievable. Thus, automated charting of vital monitors with Centricity™ HAC has assisted in saving significant time that was typically being used in documentation and paper work. The solution has helped in decreasing the nurse to patient ratio without any impact on clinical outcomes of the patient. The ICU is now perpetually equipped to handle a sudden inflow of admissions while achieving a low death rate.

Clinical Impact of Deploying Centricity™ HAC solution at Kainos Hospital[10]



>100% increase in ICU admissions between 2017 and 2018.

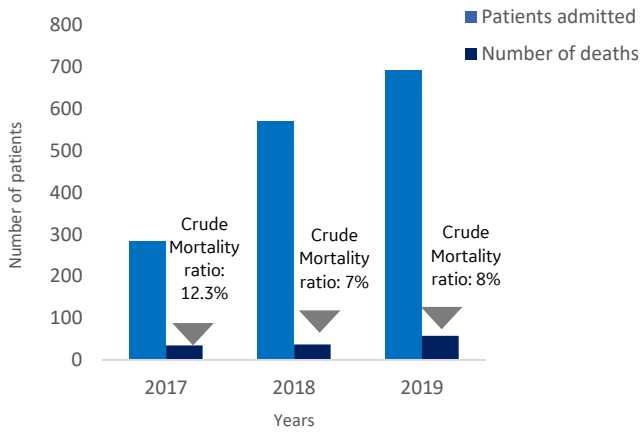
120 Admissions handled in a month

~70% survival rate in the first 6 months of inception

<8% Crude ICU mortality in 2019

4-5 Days of ICU length of stay

Trend of crude mortality ratio in ICU over three consecutive years at Kainos Hospital[10]



** period considered for the analysis – January to August 2017 versus the same months in 2018 and 2019*

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Supported by 15 ICU nursing staff and 7 round-the-clock intensive care specialists, the hospital demonstrated a capability of managing an unexpected stream of 120 patients in one month at a mortality ratio as low as 8%.

Boosting staff, patient and patient party's morale:

Burnout syndrome is cited as a pervasive issue in ICU settings. Provision of clinical services with continuous monitoring of vitals, while maintaining precise and accurate documentation is observed to be laborious. Burnout has further led to unsatisfactory patient care and higher attrition rates resulting in diminution of an already scarce workforce.

"I can get staff, I can get state-of-the-art equipment, I can develop best of protocols and standard operating procedure but I I may still struggle to teach, train and retain the staff if the work environment is not conducive and motivating."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

With Centricity™ HAC solution, smooth and hassle-free admission of patients in ICU is now possible. With paperless charting being one of the most treasured features, the staff was observed to have more time to ensure psychological well-being of the patient and patient party. This further has aided in boosting self-esteem and self-worth of the nursing staff.

Driving Operational efficiency:

In the absence of hourly paper-based charting, the ICU staff has been saving 4-5 minutes per hour. This has further translated to 30-40 minutes being conserved by each nurse in one shift. This supplementary time generated due to operational efficiencies has been leveraged to note clinical observations around patient's overall health in the system thereby aiding improved patient care. Besides, with additional time at hand, the ICU staff is empowered to handle a higher number of patients without impacting the standard of care. While the NABH guidelines recommends 1:1 nurse to patient ratio for ventilated patients, the hospital has seamlessly been able to manage nurse to patient ratio of 1:3 for non-ventilated and 1:2 for ventilated patients during peak seasons.

"I can handle 3-4 non-ventilated patients or 2 ventilated patients without any issues per shift. Since most of our time goes into observing and including input/output data, we have more time to add clinical notes such as occurrence of bed sores, lab tests, any oral drugs administered, etc."

Dharamveer Yadav, ICU Head Nurse, Kainos Hospital

Operational Impact of Deploying Centricity™ HAC solution *

Comprehensive view allowing clinicians take better informed decisions	Reduced medical errors and miscommunication during shift transfer	Automated charting of vital monitors allowing **30-40** minutes time savings/nurse/shift	Capability to handle **two** additional non-ventilated patients by each nurse

"To ensure uncompromised standard of care without transferring the cost to patients, an efficiency enhancing solution like Centricity™ is needed. It allows me to keep the cost minimal yet provide best quality of care. It helps me maintain the balance between cost and sensibility of care."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

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Ensuring smooth information handover

Typically attributed to inadequate communication and illegible paper-based charting, medical errors have conventionally led to unwarranted emergency situations. The concern was stated to be more profound during the seasonal surge in ICU admissions. However, since the deployment of Centricity™ HAC solution, medical errors and subjectivity around implementing protocols have reduced drastically. Remarking up-to-date patient related observations in the system has rendered seamless transition of care to the next in-duty nurse, thereby reducing human errors and handwriting legibility issues.

"Shift handover is the main source of medical errors. Communication gap or miscommunication due to lack of documentation or unreadable handwriting can result in medical errors thus impacting prognosis negatively. It is a nightmare as an ICU Director to manage such instances and revive an already critical patient. With Centricity™, we have all the information front loaded. It allows seamless flow of communication without causing distress and helps reduce those nervous emergency calls."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

Facilitating comprehensive view for faster clinical decisions

Centricity™ High Acuity Care solution has further assisted the clinicians assess patient's clinical status in one go. With quick and easy view of trendline chart, the clinicians are now more adept while making decisions.

SOFA: Sequential Organ Failure Assessment
APACHE: Acute Physiology, Age, Chronic Health Evaluation

Owing to high workload, most ICUs do not use conventional and specific scoring system to evaluate patient outcomes. With Centricity™, calculating conventional scores such as Glasgow Coma Scale (GCS*) has become less cumbersome. Scoring based evaluation of the patients has further helped ICU specialists reduce subjectivity and follow international standards and recommended practices. Thus, maneuvering treatment plan is considered much easier now due to instant trend view and continuous monitoring of organ level data

"We will be implementing SOFA and APACHE score shortly. We can't wait to see the impact of these specific scoring systems on patient outcomes and overall agility of the personalized treatment plan in ICU."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

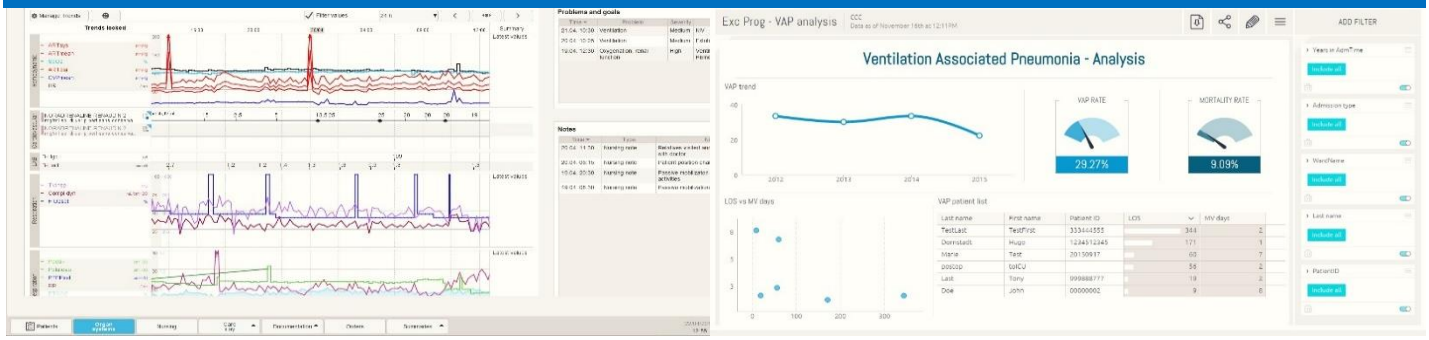
Improving productivity and throughput per bed

With number of ICU admissions growing annually, the hospital management observed a need to heighten the infrastructure by increasing the number of beds and associated staff. Thus, along with increasing the capacity of ICU beds, the hospital also sought to increase the productivity of the existing beds. Centricity™ was observed to drive benefits from both - commercial as well clinical perspectives for the hospital

"If we add more beds or even add more nurses to the handle the increasing demand, our operating cost increases. This cost would then trickle to the patients. With Centricity™ HAC, I can cater to the increasing demand by making my existing infrastructure more productive and efficient."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

Screenshots of various views available with Centricity™ HAC solution *



*GCS is used to describe the extent of impaired consciousness in all types of acute medical and trauma patients

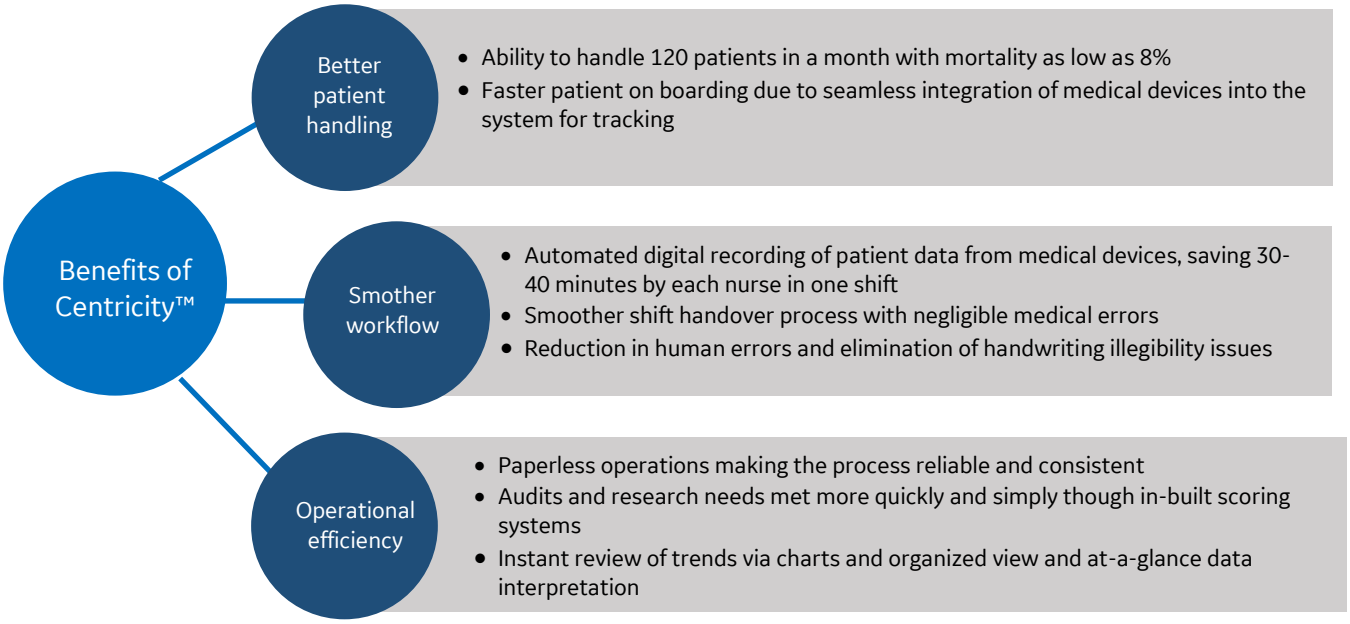
Extending the horizon of clinical excellence and quality of care

Even as the hospital continues to provide international standard of care, it has been able to manage the sensitive balance of cost to the patient and quality. Right from inclusion of technology that allows operational efficiency to training and management of strict protocols, the hospital strives to create a benchmark for clinical excellence at affordable price. Increasing number of patient footfall is perhaps indicative of the hospital's growing reputation.

Along with procedural volume, the hospital's reputation as critical care center has been improving. Moreover, confidence in referring physicians regarding the hospital's clinical capabilities has been on the rise.

This can be further substantiated by the strong year-on-year revenue growth. At >60% growth in the yearly revenues, the hospital strives to achieve higher goals.

As an outsourcing partner for intensive care unit, the ICU team at Kainos hospital aspires to shape critical care practice for other hospitals in the region. While the mission for one facility has already been initiated, two more are in the pipeline.



"Our hospital is now known for high survival rate. We want to develop similar clinical practices for other hospitals in Haryana and aspire to formulate a develop-train-transfer model for our partnering hospitals."

Dr. Arvind Dahiya, Director, Kainos Hospital and Intensive Care Specialist

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Centricity Critical Care intended use: Centricity Critical Care (CCC) is a clinical information management system intended to support clinical documentation activities and clinical decision support in Intensive Care Units (ICU) and High Dependency Units (HDU). CCC allows trained clinical professional users to retrieve, enter, record, store, transfer, view and trend patient data in an efficient and structured manner as well as to plan for therapy. Class/Notified Body: I / N/A. Manufacturer: GE Healthcare. Last revision: November 20, 2017. Always refer to the complete User's manual before use and carefully read all instructions to ensure the good use of your medical device.

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