**Title: From the Front Lines of Loss: Why Quality Critical Care is a Lifeline**

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**Abstract**

**In the world of Intensive Care Units (ICUs), machines take over human life. Life bounces back; life is on hold; life loses to the ironies of life. Some loved ones return home; others pass. ICU’s see medical professionals spending sleepless nights providing patient care, a few let their patients slip through the cracks. ICU’s see relationships and dreams getting a second chance, ICU’s see the end of relationships and much-cherished dreams. This paper looks at why quality critical care in ICU’s is a lifeline.**

**From the Front Lines of Loss: Why Quality Critical Care is a Lifeline**

**The access and quality of health care are critical to our understanding of medical ethics. The first roadblock to equitable access and quality of medical care is the unholy nexus between healthcare and privilege-most healthcare systems in the world grapple with this. COVID-19, for instance, has exposed the fault lines of all global health care systems. In my home state of New York, the racial disparity in COVID related deaths is humbling. India is no exception to healthcare disparities. Pronounced “Subnational inequalities” in healthcare were found in developed and developing nations, like China, India, and developed nations like England and the USA (1)**.

Citing the Lancet report, a September 6, 2018 news article says that “almost 122 Indians per 100,000 die due to poor quality of care each year,” placing India’s death rate due to poor care quality behind China, Brazil, Russia, Sri Lanka, and Pakistan (2). The Washington Post provides a grim picture of medical education quality in India’s medical schools. Acknowledging rightfully that India is home to some prestigious medical schools in the world and that it also produces some of the finest doctors in the world, the Post draws attention to the lack of quality education and research “There are more medical colleges and teaching hospitals in India than anywhere else — 579 to be exact. But a couple of recent studies and reports have cast serious doubts on the quality and ethics of the country's vast medical schooling system. The most recent revealed that more than half of those 579 didn't produce a single peer-reviewed research paper in over a decade (2005-2014) and that almost half of all papers were attributed to just 25 of those institutions (3). Das (2020) discusses India's medical education's loopholes and possible reforms. Quoting reputed medical professionals, “…privatisation of medical education on a large scale is creating a risk of diluting the standards of medical education… A few issues in the medical education system are mal-distribution, age-old curriculum, poor assessment standards, and minimal sufficient faculty development programmes. The medical curriculum in India suffers from a lack of integration, maintaining traditional didactic teaching methods and limited support to research” the article makes a strong case for “competency and skill-based curriculum” (4).

**Critical Issues in Critical Care**

1. **Diagnosis, Diagnosis, Diagnosis: William Osler’s (1849-1919), words** “The value of experience is not seeing much, but in seeing wisely (5)” are as relevant today, as they were more than a hundred years ago. The Canadian physician, Osler’s notion of differential diagnosis is about “methodical thinking.” Medicine is art; medicine is science. Osler’s biography discusses how “Osler’s medical art was informed and controlled by all the assistance science could give” (6). Research has shown that the most significant path to accurate diagnosis is differential diagnosis (7). Therefore, “should we not be insisting that a differential diagnosis is worked up for every patient and documented in the medical notes? The obligation to compile a differential could act as a vital trigger to stimulate thinking at the time of the consultation” (8). One cannot emphasize enough the importance of a step-by-step methodical differential diagnosis. Not doing this may result in an avoidable clinical misdiagnosis.
2. **Cardio-Pulmonary-Renal Interactions (9):** Many ICU patients have multi-organ failure, mainly including the heart, lungs, and kidney. After stabilizing the patient, it is essential to get to the cause of cardio, pulmonary, and renal failures.The interactions between the three have to be constantly monitored. “Many patients with disorders of 1 organ (e.g., CKD) die of complications of the other (e.g., HF) before the first organ’s failure reaches its fullest extent, or the dysfunction of every organ may develop slowly until a “collapse” is reached and full-blown decompensation occurs. That is, each dysfunctional organ has the ability to initiate and perpetuate mutual injury through hemodynamic, neurohormonal, and cell signaling feedback mechanisms, while multiple episodes of acute (on chronic) decompensation may lead to reciprocal end-organ disease progression” (9). Therefore, a single path, without a confirmed diagnosis, may not be the best for the patient. It is vital to rule out most serious injuries to the heart, lungs, kidney-myocardial infarction, heart failure, pulmonary embolism, etc.
3. **Chest Imaging-CT:** The COVID-19 public health crisis has shown us the importance of thorough chest imaging. Studies have shown that CT scans have played a crucial diagnostic role in COVID patients (10). CT’s role is not limited to being a diagnostic tool. It not only makes a “timely and accurate diagnosis,” it can also help in “prognostication, evaluating the disease progression and monitoring the response to therapy” (11, 12) In critically ill patients, a CT chest should be done as soon as the patient is stabilized. A study from three teaching hospitals, including 533 CT scans on 359 patients, “the CT scan as a diagnostic procedure invalidated a diagnostic hypothesis and led to a therapeutic change in more than half of the cases. The diagnostic yield of CT scan showed 40.7 % of full agreement, 5.6 % of partial agreement, and 53.7 % of disagreement with the main diagnostic hypothesis formulated before the CT scan. The CT-scan brought new elements to the diagnosis in 22.9 % of the cases. There was 54.4 % of therapeutic change after CT scan” (13). It is essential to take all steps to make a diagnosis. In critically ill patients, especially those heading into a multi-organ failure, a CT chest, for instance, can often reveal problems related to more than one organ, like the heart and the lungs. The Indian College of Radiology and Imaging (ICRI) has initiated efforts to standardize “imaging protocols in chest imaging” (14). The standard treatment guidelines established by the Ministry of Health and Family Welfare, Government of India, include CT chest as a diagnostic tool for respiratory illnesses in large super-specialty hospitals (15).
4. **Cardiac biomarkers and the recognition of MI & heart failure: The Cardiological Society of India and other leading associations stress the importance of cardiac biomarkers like Troponin T, NT-PRO BNP, and CK-MB (16)**. Cardiac biomarkers are vital in the diagnosis of an injury to the myocardium in the golden period. Troponin t is seen as the gold‐standard to diagnose myocardial infarction. “The recommendation to use cTn as a sole biomarker has remained consistent through the first, second, and third universal definitions of myocardial infarction published in 2000, 2007, and 2012, respectively” (17) …cardiac biomarkers are the cornerstone for the diagnosis of non‐ST‐segment elevation myocardial infarction” (18). **ICU doctors must be alert to cardiac biomarkers like Troponin t and NT Pro BNP. Elevated troponins and NT PRO BNP are urgent calls to rule out Myocardial Infarction (MI) and heart failure. In the case of critically ill patients, it cannot be left to a matter of speculation. It is imperative to rule out MI and heart failure as soon as the patient is stabilized. The repeat test results for cardiac biomarkers are equally important. Troponin (t) levels often increase after a few hours. Lab reports must be read in a timely fashion. Not doing so could be fatal.**
5. **Visualization of the heart:** The first-line non-invasive diagnostic tool to capture the heart's real-time images, detail its structure, function, and volume, the echocardiogram, plays a critical role in diagnosing cardiovascular diseases. The credit for the life-changing innovation goes to Inge Edler (1911-2001), "the master magician," and the father of modern echocardiography (19). Singh & Goyal (2007). in their tribute to Edler, take the reader down the historical journey to the 18th-century when an Italian Catholic priest and scientist Lazzaro Spallanzani (1729-1799) "demonstrated the ability of bats to navigate accurately in the dark through the echo-reflection of inaudible high-frequency sounds" (19),  19th-century creation of ultrasonic waves by the Curies piezoelectricity, and the 20th century Lewis Richardson's "suggestion, in 1912, that an echo-ranging technique could be used to detect underwater objects” (19) led to important war technologies. Langevin’s 1915 SONAR(Sound Navigation and Ranging) to detect submarines in World War I and RADAR (Radio Detection and Ranging) to detect airplanes in World War II (19). Finally, the 1950s saw the opening of a world full of possibilities in using this technology for visualizing the heart.

In suboptimal 2D images, ICU doctors should make sure that there is a follow-up to get accurate images. According to the American Society of Echocardiography, a suboptimal image in echocardiography is "defined as non visualization of at least 2 of 6 segments in the standard apical echocardiographic views" (20). There is a global consensus on the problems associated with a suboptimal echocardiogram- misdiagnosis and suboptimal evaluation of left ventricular function**.** “Poor lighting, chest tubes, and bandages” (21) often lead to suboptimal visualization. Patient factors like the physical body build could also result in suboptimal images.

The gift of making the right call, the privilege and honor which only doctors have. Making the right call, keeping up-to-date with knowledge, and medical competency on prioritizing differential diagnosis, ultimately lead to life and death decisions.

“Better is possible. It does not take genius. It takes diligence. It takes moral clarity. It takes ingenuity. And above all, it takes a willingness to try.”   
― Atul Gawande, [Better: A Surgeon's Notes on Performance](https://www.goodreads.com/work/quotes/1573617)

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