1. Dr. Ramsay: Why are so many preventable deaths occurring in hospitals today?

   The two main causes of preventable deaths today are 1) respiratory failure (when a patient stops breathing or doesn't receive sufficient oxygen) and 2) failure to rescue (when a patient does not receive help in time to save their life).

   Both are largely a sign of the times—the result of changing patient demographics (including the increasing prevalence of obesity & co-morbidities, etc.), increased use of medications designed to relieve pain, and low nurse to patient ratios.

2. Dr. Ramsay: Is there a way to prevent these deaths?

   Yes, there are critical physiological changes and warning signs of impending danger that can be detected as early as 8 hours before a critical event occurs IF a patient is continuously monitored for them.

   The good news is that new noninvasive medical monitoring technologies are providing unique opportunities for hospitals to continuously and rather easily monitor for these physiological changes to increase patient safety and the quality of care without invasive trauma or discomfort for the patient.

3. Dr. Ramsay: Everyone assumes that in a hospital, they are automatically being monitored. Is this not the case?

   Most hospitals largely rely on the existing medical status quo of clinical examinations or rounds where a nurse/physician checks in on the patient every 6-8 hours because, until today, the technology to continuously, reliably, cost-effectively monitor patients simply wasn't available.

   It's estimated that 9 out of 10 hospitals don't currently have the capability to continuously monitor patients or a reliable way to notify nurses/clinicians (who may be on rounds or attending to another patient) when a patient's physiological condition is changing. However, given that static, intermittent exams can miss the small physiological changes and/or patterns that occur between rounds and respiratory failure can occur within minutes, continuous physiological monitoring of hospitalized patients is an emerging new standard of care.

4. Dr. Ramsay: How are these new technologies helping hospitals to prevent these deaths?

Early detection coupled with immediate clinical notification is the best way to avoid these preventable deaths. This wasn't possible 10 years ago, but today's medical technologies are making it possible to noninvasively AND continuously monitor multiple physiological indicators and blood measurements through a simple finger or neck sensor hooked up to a small patient monitor—without removing a drop of blood or waiting for lab work.

Smart monitoring systems like Patient SafetyNet enable hospital clinicians to remotely monitor the health status of up to 80 patients on 4 separate floors. The system noninvasively, continuously tracks each patient's physiological measurements to immediately detect the early warning signs of deterioration AND automatically send wireless alerts directly to the pager/smart phone of assigned clinicians—providing the tools to help hospitals save both lives and money.

In fact, there was a study published recently that provided compelling clinical evidence about the huge impact this system is making. The study showed that a large U.S. hospital using Patient SafetyNet was able to dramatically decrease traumatic critical events 65% and costly ICU transfers 48% to improve patient outcomes and reduce the cost of care.

5. Dr. Ramsay: Are there known cases where these technologies have saved lives?

Yes, for patients, the Patient SafetyNet system can quite literally mean the difference between life and death. In a recent case, the system was credited with saving a baby's life when pain medications being administered caused the child to quickly spiral into severe respiratory depression. A very common, but unintended side effect of sedation medication designed to alleviate pain is that they can suppress breathing, resulting in respiratory depression/failure. So, in essence, the medication keeping the baby comfortable and out of pain also stopped him from breathing.

Unfortunately, the nurse was down the hall with another patient and couldn't hear the alarms coming from the monitors in the baby's room. But thanks to Patient SafetyNet, the alarms along with specific information about the baby's condition were wirelessly routed to the nurse's pager. The nurse was able to immediately respond at the bedside and initiate lifesaving rescue efforts that revived the infant. The baby recovered fully and was well enough to go home just a few days later.

Without Patient SafetyNet, this baby would've had a tragically different outcome. Of course, this is just one example of how advances in medical technologies are making hospitals safer. But, there are other medical

technologies that help clinicians to predict trouble sooner, so they can keep patients out of this critical danger zone altogether.

6. Dr. Ramsay: You mentioned "predicting trouble sooner"…how can this be done?

   Acoustic Monitoring is a new technology (and medical first) that uses a noninvasive adhesive sensor applied directly on the patient's neck to capture the smallest signs of respiratory changes without discomfort or intrusive/invasive procedures. What's unique is that the acoustic respiration rate sensor continuously assesses the dynamic acoustical quality (sound) and pattern (rate) of patient breathing to detect changes that enable clinicians to identify impending trouble before it manifests into a crisis or respiratory failure event.

7. Dr. Crimi: You have a couple of these newer technologies there with you; can you tell us how they monitor the blood without using needles?

   Noninvasive hemoglobin is one of the newest medical technology innovations today. It's really a medical first—providing critical blood results in real-time that affords us full visibility of hemoglobin levels at any point in time. Using a noninvasive sensor like these attached to a bedside monitor (Radical-7) or a handheld monitor (Pronto-7), doctors and nurses can measure a patient's hemoglobin blood level in just seconds, along with other vital measurements—all without the use of any needles.

   The bedside Radical-7 Pulse CO-Oximeter is used in the OR and at the patient's bedside to continuously measure hemoglobin, along with 8 other measurements...to help medical staff detect everything from low oxygen saturation and heart rate, to carbon monoxide poisoning and anemia. The two handhelds are lightweight and portable enough to be used in just about any patient care or emergency setting.

   All of these devices use sophisticated blood analysis technologies to analyze blood inside the finger and deliver results faster and more conveniently than traditional blood tests—putting the power of a blood lab in clinicians' hands to enable on-the-spot, real-time decision making.

8. Dr. Crimi: How do these new hemoglobin monitoring devices differ from the current blood testing process?

   Traditional blood tests involve a painful needle stick and invasive blood draw followed by a time-consuming laboratory process, resulting in the delayed reporting of a static, one-time measurement. Unfortunately, traditional blood tests are limiting in that they provide a single snapshot of the hemoglobin level at a specific point in time that has already passed, which can result in:

- ***Late diagnosis of a life-threatening condition***
- ***Delayed recognition of internal/hidden bleeding***
- ***Unnecessary blood transfusions or over-transfusion of blood***
- ***Increased patient risk and/or poor recovery/outcome***

In contrast, these new noninvasive hemoglobin monitors provide instantaneous results without the pain, wait, hazardous medical wastes, and risks associated with invasive methods. For the first time, they provide immediate, on-the-spot information that medical staff used to have to wait for…blood results from the lab. Using noninvasive hemoglobin monitors, doctors and nurses can immediately, conveniently, and cost-effectively measure a patient's hemoglobin level anytime/anywhere to instantaneously detect if a person is anemic or bleeding internally—without invasive, time-consuming blood lab analyses.

9. Dr. Crimi: Why is it so important to closely monitor a person's blood level?

   In surgery, delayed blood results contribute to unnecessary blood transfusions. Numerous published studies have cited the high rate of unnecessary blood transfusions… Approx. 85% of patients (in the hospital for more than a week) receive a transfusion… but 29% don't need it. And, as preventable deaths/injuries continue to show, delayed reporting of vital blood results is no longer an effective way to care for today's patient population.

   In fact, a new study on maternal outcomes after delivery just revealed a startling new trend—postpartum hemorrhage (excessive blood loss after delivery) is one of today's most common complications for delivering mothers, causing 19% of in-hospital maternal deaths…And it's on the rise—up 28% in 6 years.

   The ability to continuously measure hemoglobin levels provides full visibility that allows clinicians to immediately identify whether hemoglobin levels are stable, falling/declining or improving/increasing, so they know whether the patient is heading for danger or recovering/stabilizing. Having real-time hemoglobin measurements that reflect the dynamic changes occurring within the body facilitates earlier detection of internal bleeding and other life-threatening conditions.

10. Dr. Crimi: How is this new noninvasive way of hemoglobin testing/monitoring making a difference today?

    Noninvasive hemoglobin monitors deliver critical blood results in seconds—facilitating immediate, on-the-spot diagnosis and clinical decisions that can save lives, improve patient outcomes, increase hospital and staff efficiencies, reduce wait times, and decrease costs.

In areas like the ED, where approx. 34% of all visits require blood tests and the wait for these blood test results fuels over-crowding and long delays, you can see how immediate noninvasive hemoglobin testing could help to reduce care delays and improve patient throughput.

In the OR, noninvasive hemoglobin monitors are being used to more closely track and trend hemoglobin levels—facilitating better decisions about when to transfuse blood and, more importantly, when it's unnecessary. Continually assessing hemoglobin in this way helps the OR team to more conservatively manage blood transfusions—reducing unnecessary risks and costs.

In ICUs & General Care Floors, continuous measurement of hemoglobin levels enables earlier detection of unsuspected internal bleeding, especially after surgery, and helps to ensure that patient blood volumes remain at optimal levels necessary to support healing and improved recoveries/outcomes.

Outside of the hospital, noninvasive hemoglobin monitors are making their way to physician offices, clinics, ambulances/emergency medical services, and blood donation centers where they can help clinicians to immediately detect chronic or acute anemia and internal bleeding—enabling the ability to initiate appropriate treatment in the same visit.

11. Dr. Crimi: What's the implication of this new monitoring technology?

The implications for both patients and healthcare are significant. Hemoglobin testing is the most common blood test performed with over 400 million performed each year in the U.S. alone. Using continuous, noninvasive hemoglobin monitors could reduce invasive blood testing and save millions of healthcare dollars.

Blood transfusions pose significant health risks for patients, so avoiding them or limiting the amount of foreign blood that gets introduced to the body is exceptionally important to help guard against transfusion-related complications and deaths. Using continuous, noninvasive hemoglobin monitors can help clinicians to more conservatively manage blood levels to reduce the number and amount (units) of blood transfusions.

12. Dr. Crimi: Not all hospitals monitor patient blood levels like this. How can patients ensure they're being monitored adequately?

Some hospitals in the U.S. are currently using this noninvasive hemoglobin monitoring technology, but there are many others adding it, so it's best to ask. Patients planning to have surgery are encouraged to first check with

their physician or the hospital to find out if they have noninvasive hemoglobin monitoring capabilities because it may help to reduce the likelihood of an unnecessary blood transfusion and could help improve their outcome. If the physician/hospital does not have access to this type of technology, patients should inquire into how they will be monitored and talk about blood transfusion and conservation strategies with their physician/surgeon before surgery.

13. Dr. Ramsay: How can patients ensure their own safety while in the hospital?

The key is to be proactive. Find out if your local hospital, or the hospital where your loved one is being treated at, continuously monitors patients using a 'technology safety net' like the Patient SafetyNet. If not, ask if and how you will be continuously monitored during your hospital stay.