On a mission to improve maternal safety

Each day nurses and providers have layer upon layer of information piling into their clinical workflow. Even without considering patient care that's a lot of data to process. Then add the fact that positive patient outcomes rely on immediate clinical decision making, and the pressure mounts significantly. A leading cause of maternal death is a delayed or inadequate response to clinical warning signs [1].

Now imagine information filtered, tested, and delivered in a secure manner that builds reliability into the data and aids decision making. Of course, there is still an absolute need to have intervention decisions made by human clinicians and not computers, but if a clinical software prompt is timely and specific, that's a strong incentive to see the information as a helpful tool in the toolbox.

Now consider this: the unfortunate fact is the USA has the worst maternal mortality rate in the recognized developed economies [2] [3] [4]. The number of deaths is equivalent to two large commercial passenger aircraft crashing annually, and this vivid descriptor is one we hope catches a glance from everyone involved.

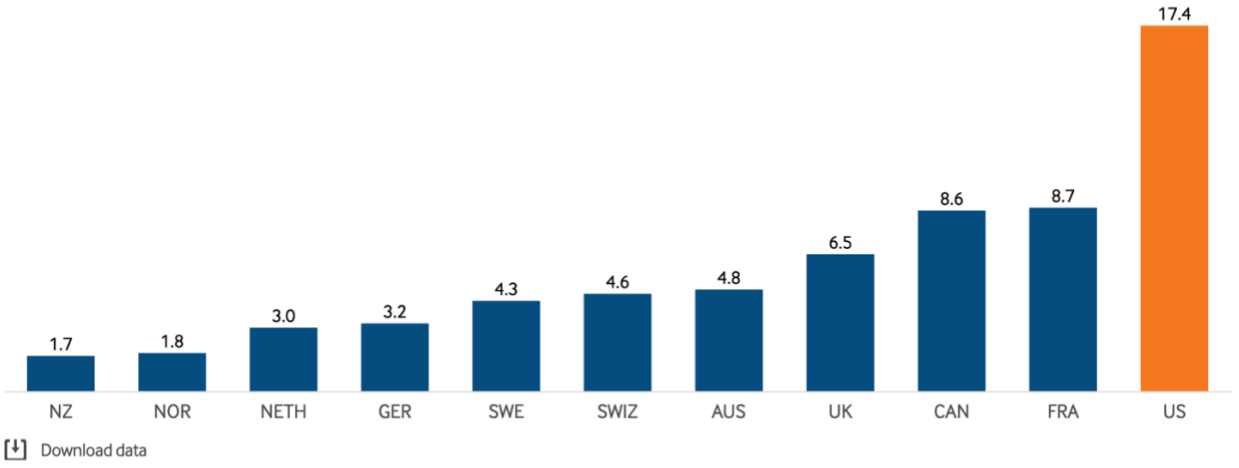
But even that shocking figure only opens a door onto another set of unfortunate statistics: for every single maternal mortality, there are 70-maternal morbidity cases [5].

Let's stop and consider that statement for a moment. Not only does the USA have 2- to 10-times the number of Mothers die than in any other comparable developed country, but an additional 70+ are somewhere at risk of dying during their childbirth or within the accepted norms of 42-days beyond childbirth [6].

Exhibit 1

Maternal Mortality Ratios in Selected Countries, 2018 or Latest Year

Deaths per 100,000 live births



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Notes: The maternal mortality ratio is defined by the World Health Organization as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Data: OECD Health Data 2020, showing data for 2018 except 2017 for Switzerland and the UK; 2016 for New Zealand; 2012 for France.

Source: Roosa Tikkanen et al., *Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries* (Commonwealth Fund, Nov. 2020). https://doi.org/10.26099/411v-9255

But there is good news. The underlying trend is improving, and it is very clear the healthcare community is focused on reducing mortality and morbidity rates.

Data may well be the vital tool in the clinician's toolbox, with more accurate and timely data pointing to care needed in the live environment. Automated systems may improve obstetric care by reinforcing important clinical cues [7].

The worldwide pandemic gained focused attention and much media coverage for obvious reasons. Death tolls, vaccine development, and employment concerns have strained U.S. cities and towns and wreaked havoc in a way we have not experienced for perhaps 100-years, but certainly since WW2. Hospitals have needed to ramp up safety and treatment measures to adjust and care for the sickest of patients infected with the virus. The impact of COVID-19 has challenged the delivery of care in every facet of healthcare. But it also provided rapid technology development, illuminating the necessity of these tools in aiding healthcare.

Complex comorbidities aside, there is delay in diagnosis, delay in treatment, and lack of agreement in standard protocols. Arguably, communication breakdown between hospital system teams is a reason for maternal deaths or near-miss occurrences. There is also a disproportionate number of deaths among the African American population. There is not a single reason, but many that contribute to poor outcomes that should not occur.

Experts have agreed that risk assessment tables within ACOG, Safe Motherhood Initiative, and OB bundles and checklists are helpful. Early warning signs can be identified in patient assessments, maternal vital signs, and quantification of blood loss. Hospitals have implemented obstetric drills, and with that, evidence-based protocols have followed. OB units have maternal hemorrhage carts at the ready and have regularly scheduled drills to become familiar with and evaluate reaction plans. The Joint Commission has added 13 new performance elements for hospitals to be surveyed, effective July 2020. Community education promoting prenatal care and maternal fetal clinics are available to some but not all rural areas.

A new approach

Taking the knowledge acquired in the past several years and learning that 60% of maternal deaths are preventable [8], perhaps we need a novel approach? In this age of technology and the considerable number of data elements being captured continuously in the hospital setting, we have not utilized EHR systems, medical monitoring devices, and various notifications in a unified manner.

The disconnected teams in lab, pharmacy, IV therapy, respiratory care, nursing, anesthesiologists, and obstetricians can have tunnel vision in completing their individual facets of patient care and, albeit unintended, an individual nurse or physician may not see the full picture of a declining patient condition.

The future of healthcare will include smarter technology, predictive about illness or deteriorating condition. Global collaboration and knowledge shared have produced transformational products. If a trusted relationship between physician and supportive technology develops it can free up the physician to spend more time with patients at the bedside knowing that the supplementary technology tool is still working in the background. Together the team will be stronger and allow the physician to practice at the top of their license and know they will stay well-informed of changes in patient condition.

Clinician burnout caused by burden has impact beyond clinicians. Historically, the healthcare industry has relied on clinicians to adapt and stretch, but has now reached a point where clinicians find it more difficult to bear the load while maintaining desired outcomes and safe care. Anxiety grows when trying to be sure we have seen and done everything necessary for the safety of patient.

AlertWatch:OB

Let's consider the technology now available to advantage the patient. Healthcare providers have been tainted by the idea that 'new' means 'more work for me' mentality when it comes to medical software, but the difference here is a technology working FOR the clinician and not the other way around.

A nurse or care provider does not have to enter additional information for computer analysis to be working in the background extracting and assimilating network data. AlertWatch:OB (AWOB) will automatically assess and reassess MEWS/ACOG PPH risk criteria every 5 minutes for every patient 24/7. The notifications to staff are on a need-to-know basis, from bedside nurse, then care provider to response team. The decision on who is notified, and when, can be pre-determined by the hospital to include the gravity of the situation. All care teams have data streaming in/out and, if an emergency occurs, the communication has already been set in motion and teams can be early-warned and early prepared. If certain criteria are met, AWOB automatically checks the blood bank for blood availability for that mom, and the IV size to see if it is large enough for a blood transfusion, 18 gauge or greater.

The beauty sits in a technology that it is specifically designed for surveillance throughout the peripartum continuum. The labor and delivery units continue to care for a parturient with increasingly complex comorbidities. A system can summarize individual and aggregate patient information as a patient moves from initial admission or triage, throughout labor, and eventually post-partum. For example, blood loss

can be calculated along the patient stay so that a portion of an admission is not isolated from the rest of the in-patient episode. Computer technology can assist highly complex considerations where one human brain cannot keep track. Furthermore, unconscious bias is not a factor in software technology.

One could be concerned with predefined maternal early warning system criteria such as those of MEWC, would result in an inordinate number of notifications to physicians, but nurses assigned to the patient are the first responders to confirm aberrant vital signs. Additionally, based on user feedback, notifications can be suspended during the second stage of labor when maternal expulsive efforts naturally generate tachycardia and hypertension. During this time, a patient who is closely monitored with one-to-one nursing care usually has that care-provider remaining at the bedside, and therefore the nurse does not need alerts to be generated.

Census view, individual patient view, and report summaries make AWOB user-friendly for all staff involved with care of a patient. No longer will anesthesia feel that “they were the last to know about a newly admitted high-risk patient.” Actively evolving sepsis can be elusive, but here is where a computer putting all the pieces together objectively and notifying care providers is highly useful. The FDA-cleared web-based application can be utilized from anywhere, on the unit, at home, on mobile devices, etc.

The COVID-19 pandemic has given rise to novel and innovative technology to keep clinicians apprised of a patient's condition without returning continually to the bedside. We are never going back to the way we were business-as-usual. Cohort care in a labor setting may include an in-room patient assessment of vital signs, FHR, uterine activity, IV and catheter assessments, and medication administration. Additional care would include position changes, comfort interventions, and epidural catheter site assessment.

In between these assessments AlertWatch:OB continues minute-to-minute monitoring of the patients' condition, changes in vital signs, lab results, and data items as they are documented in the medical record and gathered from medical devices. The AWOB system offers increased confidence for the bedside nurse and remotely located physicians about a patient's condition, or it notifies them if the patient condition changes, so rapid intervention is timely. In addition, the reaction plan for intervention, protocols to follow, and medications to administer are decided in advance.

The likelihood of harm related to maternal hemorrhage, severe hypertension, or sepsis is reduced with rapid intervention. The inexperienced nurse who may not recognize the significance of a pending worsening condition in a patient is supported by a predetermined order of notifications in place. To reduce pages triggered by artifactual vital signs, labor and delivery nurses can be paged to recheck any abnormal vital signs for confirmation before pages are sent to physicians, reducing potential alarm fatigue.

The EHR search for information in a crisis can be slow and tedious and hemorrhage happens fast! The need for faster feedback is prevalent, and this may just be AWOB technology's finest feature. A color-coded visual human body image is presented, and the user clicks on the image to see more detail. For example, click on the AWOB patient uterus that has automatically color-coded to orange, and the result is instantly seen that the patient has a current presentation of an abnormally placed placenta, or history of a prior postpartum hemorrhage. Click on the red trachea and see that the anesthesia assessment concluded the patient airway history requires a Glidescope for intubation. The software utilizes actively streaming information and recognizes there is a deviation from normal, the care provider receives the information promptly, with time to react and reduce missed opportunities for quick intervention.

Laboratory results are visual and clearly graphed throughout a patient visit so that a clinician can visually and quickly see precisely when a blood sugar dropped, spiked, or was last checked. Precautions needed before entering a room, such as Contact Isolation, Risk Factors and Obstetric Comorbidities, are easily found on the patient data touch screen.

Patient information, real-time data, speed of communication, and notifications together promote patient safety and clinician reassurance of the well-being of the patient. And ultimately, isn't that what inpatient healthcare is all about?

Conclusion

Now let's recall those figures from the beginning of this article.

700-maternal deaths and 49,000-maternal morbidity risks in the USA each year amongst 3.8-million live births may seem statistically a small figure. But every single one of these instances involves a mother and baby, a partner, siblings, family, a wider friendship group and let's not forget the clinicians, physicians and other healthcare workers for whom these figures are all too real.

If we were able to recognize subtle changes, receive the information on every patient and react with a trusted gold-standard protocol, we may be able to reduce missed opportunities for positive outcomes. Just one saved life, one safe outcome, one positive intervention makes a monumental difference to everyone involved.

Technology delivers convincing opportunities to positively impact lives, support providers and nurses, and helps to deliver safe outcomes to families. AlertWatch:OB, the first and only FDA-cleared technology devoted to maternal safety, does just that [9].

Quite an enticing opportunity.

References

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