

# NEONATOLOGY TODAY

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#### Hot Topics in Neonatology

Dec. 9-11, 2013; Washington, DC USA  
[www.hottopics.org](http://www.hottopics.org)

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#### Specialty Review in Neonatology

Feb. 18-23, 2014; Orlando, FL USA  
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#### NEO: THE Conference for Neonatology

Feb. 20-23, 2014; Orlando, FL USA  
[www.neoconference.com](http://www.neoconference.com)

#### 5th Bangkok International Neonatology Symposium

Feb. 27-28, 2014; Bangkok, Thailand  
[www.bkkneonatology.com](http://www.bkkneonatology.com)

#### International Neonatology Association Conference (INAC 2014)

April 3-5, 2014; Valencia, Spain  
[www.worldneonatology.com](http://www.worldneonatology.com)

#### 11th National Advanced Practice Neonatal Nurses Conference Sheraton

April 23-26, 2014; Honolulu, HI USA  
[www.academyonline.org/APNNC](http://www.academyonline.org/APNNC)

#### Annual Neonatal Advanced Practice Nursing Forum

May 28, 2014; Washington, DC USA  
[www.chadkids.org/apnforum](http://www.chadkids.org/apnforum)

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#### Corporate Offices:

8100 Leaward Way  
PO Box 444  
Manzanita, OR 97130 USA

#### Editorial and Subscription Offices

16 Cove Rd, Ste. 200  
Westerly, RI 02891 USA  
[www.NeonatologyToday.net](http://www.NeonatologyToday.net)

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## How Can We COPE with CPOE?\*

This article has been peer reviewed \*

By Mitchell Goldstein, MD and T. Allen Merritt, MD

Computerized Physician Order Entry or Computerized Provider Order Entry (CPOE) is the wave of the future, and this future is now! Computers are supposed to keep physicians from ordering medications in error, suggest alternative medications when hospital formularies do not stock particular pharmaceuticals, and prevent the wrong orders from being written on the patient by requiring multiple layers of authentication. Some of these systems may even suggest less expensive options for specific drugs when a more expensive drug is ordered. Do these systems keep us and our patients safe or are they impediments to our doing an adequate job as physicians? Do these systems, designed primarily for adults, actually speed up processes in the NICU or impede logical evidence-based approaches to ordering what is in the patient's best interests in a timely fashion? Has CPOE made direct communication between physicians and physicians, physicians and nurses and other allied health professions obsolete?

Certainly, the intent is laudable. Electronic Medical Record (EMR) vendors program computers to recognize interactions that can potentially harm patients and make that information available to physicians. Potentially, deadly interactions can be avoided and lives can be saved. An integrated health information system can enable physicians and other health care providers with the tools to rapidly access medical records, imaging, laboratory data, progress, and consultation notes in a seamless continuum. Care provided in the medical center may be transferred to the outpatient provider, the pharmacy across town, or the consultant to share an image or interpretation. This panacea is far from the reality.<sup>1</sup>

In trying to provide a complete solution, CPOE overwhelms clinicians with irrelevant information. Where should these systems draw the line? There is an interaction between hydrochlorothiazide and KCl, but is this interaction a contraindication to administration of one of the medications or an intended effect? Do neonatologists have to document with each set of admitting medical orders that the extremely premature infant with no previous medical history does not have allergies? What about systems that warn of that fact that a particular medication does not have an FDA (Food and Drug Administration) indication for premature infants, or that heparin at any dose (as infused through a umbilical arterial catheter) is a contraindication for a host of other medications? Does a physician need to be reminded or warned that Ampicillin passes through the breast milk of a breastfeeding mother on all babies that are admitted to a NICU? These sorts of warnings harken back to the tale of the boy who cried wolf too many times. Continuous warning of physicians of intended therapies, interactions that are non-consequential, and those that lack FDA indication for neonates (few medications have one anyway); and physicians will not respond to warnings or "override screens" when a real problem exists.

***"Computerized Physician Order Entry or Computerized Provider Order Entry (CPOE) is the wave of the future, and this future is now!"***

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**FEBRUARY 20-23, 2014**

NEO: The Conference for Neonatology addresses cutting edge, yet practical aspects of newborn medicine. Educational sessions are conducted by many of the foremost experts, who address neonatal-perinatal topics for which they have become renowned.

**Target audience:** All neonatal-perinatal providers, including neonatologists, advanced practitioners and staff nurses.

**Topics include:**

- Getting Stareted on the Right Foot — The Early Care of the Critically Ill Neonate
- Respiratory Support 2014 — What Do You Do, When Do You Do It?
- Neurological Injury in the Neonate
- Nutrition and the Neonate
- The Fetal Patient

SPECIAL INTERACTIVE SESSION: Surviving the NICU — Parents' Perspectives



## **SPECIALTY REVIEW IN NEONATOLOGY**

**FEBRUARY 18-23, 2014**

Specialty Review in Neonatology, the leading review of its type in the country, is an intensive and comprehensive review of neonatal medicine. This course is an invaluable learning experience for those preparing for certifying examinations, as well as new or current fellows-in-training seeking an outstanding fundamental pathophysiology course in neonatal-perinatal medicine.

**Target audience:** Neonatologists, residents, fellows and advanced practitioners.

**Topics include:**

- Maternal-Fetal Medicine
- Neonatal Respiratory System
- Neonatal Cardiovascular System
- Neonatal Endocrinology
- Neonatal Nephrology
- Neonatal Infectious Diseases
- Central Nervous System

As summarized by Sharek and Classen, efforts to improve patient safety have been hampered by relatively inaccurate measurement techniques; however, recent evidence suggests detection of adverse events is improving with the aid of the more focused and efficient trigger-tool measurement technology.<sup>2</sup> For hospitalized children there are 11.1 per 100 patient adverse drug events, and in NICU patients, 74 per 100 patients. "Several studies show CPOE reduces medication errors significantly after implementation, yet few studies to date have linked CPOE with significant reductions in adverse events," and at least one study suggests that CPOE, when not implemented effectively, can increase patient harm.<sup>3</sup>

At night when an on call physician is trying to get sleep, he/she can be interrupted several times during the night with questions regarding his/her patients. Imagine a situation where an NICU physician is on call for 30 or 40 patients. A simple order such as a diaper rash cream for a worsening perianal irritation, which could have been given verbally in the not so distant past, now requires that the physician get up, turn on the computer, sign on to the CPOE program, correctly identify the patient, navigate to the correct order set, override the contraindications to use, and finally trigger the order. When the nurse calls the physician five minutes after the order is written to inform him that the order was written on the wrong twin, the physician must again get out of bed and repeat the process, and as well remember to discontinue the medication on the other twin. Multiply these processes by 40 patients, and the magnitude of the problem becomes clear. Increase the complexity of the computer order entry for orders, factor in unfamiliarity with how to drill down to a particular order entry screen and the physician is now up for more than fifteen minutes or longer. The nurse may need to track down the pharmacist and verify that the correct dose did indeed arrive in the pharmacy at 4 AM in the morning because the CPOE system did not notify the nurse that the appended order had been entered and clarify the order with the physician an hour later as to which buttock the cream was to be applied. Never mind the prospect of a patient in extremis, keeping a physician up all night long, a diaper rash has now elevated the patient decision-making to critical. The former verbal communication to a well-meaning nurse with a direct order for a medication is but a distant memory. This overconsumption of physician time was documented in a work-sampling analysis of physician's activities where Ammenwerth and Spöti documented that nearly as much time is being spent on documentation (or documentation in ordering) as is spent on direct patient care.<sup>4</sup>

The time involved in putting these orders in is staggering. Physicians are reminded that order entry should not involve more than a min-

ute per order once they know the system, or the upcoming revision that was promised months ago. However, the previously acceptable written orders often using pre-printed order sheets actually saved physician time. Using this same forty patient metric, factor in a couple of admissions, several discharges, overnight call, and the invariable need to correct orders written incorrectly in the CPOE, a physician could end up putting 300 to 400 individual orders into a CPOE system in the course of an evening. At even one minute per order, this translates to five or six hours per 24 hours.

Clicker fatigue is rampant. Often times, physicians have to drill down more than five sets of menus to get to the ordering screen. Couple in the selection of the desired form of the medication, whether the medication should be given IV, PO, IM, PR, or SC, whether the medication should be given BID, TID, QID, UD, Q6 or Q12 or once, the scroll bar to get to the proper interval (if the interval even exists), whether the dose should be based on a defined stop date or a specified number of doses, and the physician may have to click the mouse more than twenty-five times just to get the correct dose to appear on the screen. Even when the medication is selected, the physician may need five or more clicks to get through the warning screens. We need to plan for more physician disability from Carpal Tunnel Syndrome or Computer Posture Syndrome—often referred to as a "pain in the neck."

Early systems touted the advantage that these CPOE systems had in producing efficiencies that would decrease the amount of paper that was used to enter physician orders. Numerous hospitals have actually seen an increase in paper used because each individual order is printed on an entire sheet of paper. Some hospital medical record departments scan each individual order sheet because these pieces of paper have now become part of the chart. This process has the additive effect of doubling the amount of processing involved in storing every order that is entered. In some medical centers ordering a specialized test (e.g. Kleihauer-Betke staining of maternal blood for a fetal maternal bleed or ordering an esoteric genetics test) is virtually impossible. Even ordering a CBC with a manual differential becomes more than one click; it is a series of clicks. Moreover if the adult default is an automated differential, this default is propagated to the neonatal order set. Adult norms for lab values are also defaulted to neonatal patients. These "norms" demand default physician notification for values that would otherwise be regarded as normal and in turn require additional physician interaction. The physician may be required to enter "No new orders" into the CPOE system to satisfy the notification requirements for a normal lab value.

Most hospital CPOE systems are predicated on a single physician having a hospital-based practice in a single hospital. Some systems have evolved to allow a physician office-based solution or even a solution across multiple hospital systems. But, what is a physician to do if he has five or six different hospitals with different CPOE systems? Does that physician need to install clients for all hospital systems in his office?

What if a patient decides to follow-up in a non-CPOE clinic or in another hospital system that has yet another CPOE variant? Certainly, each one of the CPOE vendors has invested heavily in training programs which can help a physician reach proficiency in their CPOE program, but what if that physician has to round at a different hospital with a different CPOE system each day of the week? Let alone remembering the passwords, which have different complexity requirements at each hospital and different requirements for when they must be changed, each CPOE system goes about order entry and documentation in a different way. Some incorporate the orders in the daily note, some incorporate the daily note in the order, and each has a different way of setting the problem and or diagnosis list. How can a physician reasonably be expected to accommodate each and every interface into his practice? What toll on physician efficiency will CPOE take when the physician has to call information systems support weekly for advice on how to enter a common medication order that has a different format in every venue?

Physicians do not design these systems. Education regarding their use is often spotty and not by "super-users" with vast experience in the clinical environment of a specific group of physicians (e.g. Neonatal Intensive Care). Rather, after the systems are introduced, physicians are then exposed to how to navigate the computer system focused on their individualized needs. The "learn on the job" apprenticeship is the current mode of introduction, and woe to the physician who has multiple critically ill infants admitted during that period of time. At one facility, the Information Technology HELP line fielded 35,000 HELP calls during the first weeks of CPOE introduction. Numerous physicians own tablets or laptops with beautiful graphical inter-

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***"At one facility, the Information Technology HELP line fielded 35,000 HELP calls during the first weeks of CPOE introduction."***

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faces that are designed to facilitate their use. Programmers put these CPOE interfaces together in a way that is most efficient to gather data, but infrequently with physician-user buy in. Although CPOE is an important part of meaningful use, who decides what constitutes “meaningful” if the CPOE stands in the way of the physician interacting with the patient?<sup>2</sup> The Norman Rockwell image of the physician with the kind eyes and the stethoscope gives way to the physician who never makes eye contact with the patient, is forever tied to the keyboard, and cannot loosen his grip on his mouse, concerned that the resulting hit to his productivity will doom his practice, regardless of the incentives provided to achieve compliance. Indeed, this is dramatically illustrated in a child’s drawing of the pediatrician with his sole focus the computer in front of him (Figure 1). This experience is not unique and others have noted that the physician is only focused on the computer. Both parents and physicians have lamented that the interpersonal interaction with the patient is now a thing of the past.<sup>5, 6</sup> Office and ward “spatial” designs influence how patients (or their parents) perceive doctor-patient communication, and only if physicians took “breakpoints” or intervals of no computer use and sustained eye contact with patients” was there a positive influence on the physician-patient interaction.<sup>7</sup> In the NICU, it is not infrequent that 3 or more WOWS (Workstations on Wheels) join the physician on rounds with screens that obliterate the view of the infant and the parents. These compete for space, and the quality of the physician-parent interaction is degraded. It is not unheard of that parents feel frustrated by their inability to navigate this wall of technology (Figure 2) and request a separate conference in a room without the obtrusiveness of computers.<sup>8</sup>

What is the metric for the percentage CPOE’s to achieve compliance? Some hospitals set the target at 75% so that a nominal 60% of medication, 30% of laboratory, and 30% of radiology orders can be recorded to reach the benchmark for Stage 2 Eligible Hospital and Critical Access Hospital Meaningful Use Core Measures.<sup>9</sup> However, individual hospital systems can set the bar much higher and even tie future physician contracts to achieving even a higher

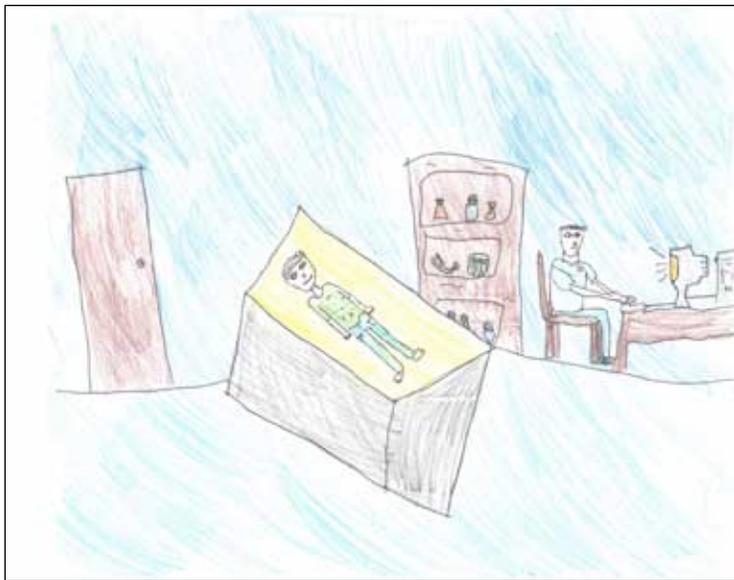


Figure 1. The doctor’s office (rendition by Boris Goldstein).

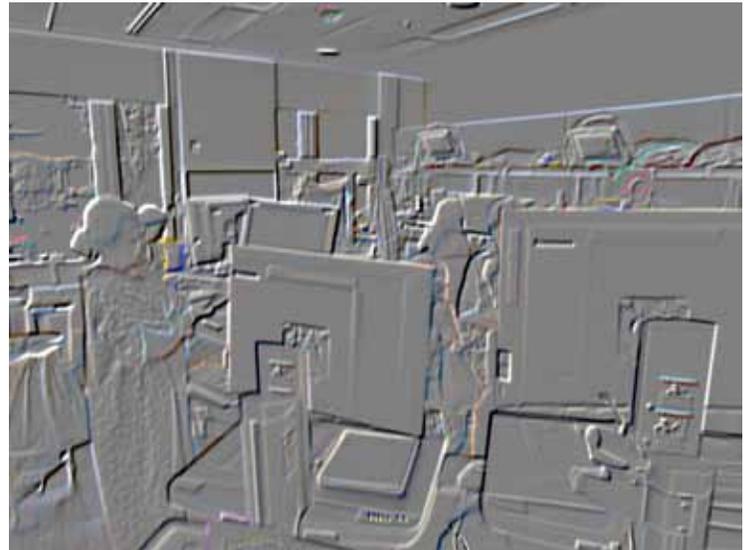


Figure 2. A virtual wall of computers separating physicians from patient interaction.

level of compliance. Because neonates are hospitalized for longer than most patients, seen by a consistent group of physicians, and known to generate a high volume of orders since they are frequently one of the largest patient populations in the hospital, targeting the neonatologists with a high metric for compliance can help “carry” the rest of the hospital’s physicians.

Are legacy systems counted? Generally, CPOE is only an order that originates and propagates from the commercial CPOE system that it is entered into. Legacy systems and systems that do not have a reasonable CPOE alternative (e.g., Neonatal TPN) do not count for CPOE, and may even count against the physician or physician group that persists in ordering a medication or procedure that cannot be ordered any other way. Moreover, within the CPOE system, if an order is entered in a non-compliant way, it may be counted as a written order and not credited to the CPOE percentage. Each hospital approaches each practice within differently, creating disparity between different physicians and practices. The emergency room may be allocated scribes because it is the only way to expediently provide care. The NICU physician, in house for up to 36 hours at a time, who covers 40-50 patients alone at night, may be required to get out of bed every half hour to place an order in the CPOE system. Under this new world “order,” verbal orders are discouraged even in the event of an extreme emergency. After all, these orders count against the compliance number. If the percentage is too low, regardless of the circumstance, ultimately the physician will not be able to provide care at that particular hospital.

Teaching residents and medical students is a special problem. The formulation of an order was an actual teaching point in “ancient” times. Using a black or dark blue pen, the physician in training was taught to write clearly, avoid inappropriate abbreviations, and effectively communicate the parameters of the order to nursing or pharmacy staff. Now, order writing is a lost art. Physicians need only to pick and click. However, the USMLE Step 2 Clinical Skills (CS) exam assesses the ability of student to examine, to apply medical knowledge,



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skills, and understanding of clinical science essential to the provision of patient care under supervision. The CS examination also places emphasis on health promotion and disease prevention. Equipment and examination instructions only permit a computer to be used for word processing after a mock patient is evaluated and outside of the patient area. Noteworthy is that there is a requirement to use pen and paper and formulating a narrative or list format without the use of any specific EMR format. It may be assumed that during the Postgraduate Year 1, the needed computer skills will transfer from experienced learner to inexperienced learner, but in urgent clinical situations these young physicians are not prepared to navigate a complex order system to simultaneously order vasopressors, various forms of mechanical ventilation, antibiotics, blood products, and set parameters for their usage.

The art of dictation is also being lost. While most seasoned physicians recall the days where a procedure, a progress note, let alone an admission or discharge could be dictated, dictated notes are primarily reserved for surgeons' operative notes. Although many vendors gladly demonstrate their voice recognition programs to medical information officers, these added cost "extras" are not usually available to ward physicians, let alone post-graduate resident physicians. Physicians now are relegated to the same tasks that would have been assigned to assistants, medical secretaries, or ward clerks. The gains in efficiency that were promised by our new digital prowess in speech pattern recognition are taken away by the cryptic requirements of CPOE systems and the high per seat cost of the more adaptive systems.

What happens in a natural disaster or even if the power goes out to the "non-essential" power plugs in the hospital? Yes, this really occurs! Remember Katrina? Or Joplin, Missouri; Norman, Oklahoma, or Wichita, Kansas after the devastating tornados or storm-related power outages? Some system disaster plans offer that orders may be placed on paper, but even these orders eventually need to be entered electronically because of the need to meet a "meaningful use" objective. Although at the rate the change is occurring, many physicians will be uncomfortable or unable to enter orders by hand anyway. The "art" of order preparation may be lost during highly stressful events. Nevertheless, even if correct paper orders were entered during the crisis, most orders must be back entered into the CPOE once power has been restored because the Stage 2 Eligible Hospital and Critical Access Hospital Meaningful Use Core Measures metric is just something that will not go away.

Does CPOE make providing care easier? From a perspective of the time involved in order entry, it is a difficult case to argue. Few physicians will tell you that their CPOE makes order entry easier or more productive than before. Many examine their patients at the bedside and "retreat" to their computers to enter orders. Because nurses are at the bedside and not at the computer, some orders don't find their way to the appropriate bedside until after their application time. The physician nurse interaction at the bedside chart has been all but eliminated. There is the prospect of using tablets or other hand held devices at the bedside, but these methods lack the presence of a physical keyboard, have a limited battery life, and must be carried at all times. Most find that they wish for the pre-printed order sheets with all the pertinent orders pre-populated that once made the job of admitting a patient simple. Others long for a blank order sheet with room to specify the orders in long hand in such a way that it was easy to understand and would not require innumerable phone calls to clarify that the physician really only wanted one dose to be given. Now, orders that are printed out may not even resemble the order on the screen. Various obligatory parameters are added. Sometimes the entire order is re-printed even though the context was to discontinue the administration of the particular medication or procedure. The need for additional clarification is common. Of course, this clarification can only be in the form of an additional order entered by CPOE.

Does computerized order entry actually improve care? The evidence is lacking. In this day and age of evidence-based care, it is presumed that because CPOE's provide evidence of drug incompatibilities, "bet-

ter" formulary-based selection, and a point-and-click access to innumerable medical references that once lined the shelves of physician offices that these resources provide the link to "evidence" based care. However, the systems themselves have not been shown conclusively to be constructed or used in a way that has evidence supporting its implementation. There have been reports of physicians forcing hospitals to remove CPOE systems because of the effect these systems had on care provision. In certain settings, it has been argued that use of a CPOE system contributed to patient morbidity or mortality.<sup>10</sup>

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## ***"Does computerized order entry actually improve care? The evidence is lacking."***

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Does CPOE prevent errors? As productivity declines, errors increase. Physicians striving to keep up with frequent demands for orders are forced to flip back and forth through electronic charts. True, there are multiple validation screens and multiple "safeguards" in place, but there is no physician-patient or physician-nurse interaction because the order entry is remote to the point of action. The verbal feedback from the nurse is eliminated, and the physician is not impeded in entering the right order on the wrong patient, or duplicating an order when a discontinuation of an order was intended. Miller and Tucker in their thorough analysis "Can Health Care Information Technology Save Babies?" argue that the estimated health benefits associated with computerized health care information technology may reduce 1.6 deaths per 10,000 live-births (not just CPOE) but that the costs of adopting healthcare information technologies include upfront costs of software and hardware installation, training and support staff, and ongoing maintenance with an operating cost of \$12,060 per bed (2007, American Hospital Association). These targeted changes cost \$1.1 million per life saved after adjusting for inflation.<sup>11</sup> Their research found that the drop in neonatal deaths was driven by a reduction in deaths from diseases originating in the perinatal period. These conditions require careful monitoring and are not necessarily improved by increased access to data. They found no effect on deaths due to SIDS or chromosomal abnormalities-conditions with less evidence for process-based medicine to reduce or prevent adverse outcomes. Further, they report that the most beneficial effects are improved birth outcomes for historically disadvantaged groups. There is no evidence that the gains attributable to the use of CPOE or the electronic medical record are focused on women or children from higher socio-economic backgrounds. However, the most advanced information technology platforms are in the elite medical centers in the "high rent" district, not in the federally funded clinics in under-served areas, or in remote areas with under-served populations.

In an era of information technology, if we are to improve infant outcomes, we must overcome many of the former concepts of risk for adverse outcomes (e.g. gestational age, extremely low birth weight infants, maternal chorioamnionitis, prolonged use of supplemental oxygen). Databases with high throughput sequencing that improve the processes of care must be used to avoid NICU iatrogenic problems, central line associated infections and ventilator mishap. We must speed response to crisis, implement proven neonatal resuscitation programs, eliminate faulty discharge planning that requires readmission for subsequent care, and thereby, improve long-term outcomes. We must also shift from single event interdiction approaches to problem-oriented approaches where probabilities are based on multiple factors in CPOE. Specific population based order-sets that account for such attributes as prematurity, postnatal age, renal function, hepatic function, digestive function, and even brain function must be employed in order to reap benefits from CPOE.

Does CPOE make care safer or more inter-connected or is it like "Diving into a Shallow Pool?"<sup>12</sup> Safe care depends on physician availability. If a physician is tied up with CPOE, she or he cannot readily disengage to

resuscitate a patient. He or she must first suspend entry, then finish the pended order, and finally, to remain HIPPA compliant, blank his screen and lock the keyboard. Never mind the fact that there are valid emergencies or multiple disruptions; if the percentage is too low, the perception is that the physician is not practicing safe medicine because he is circumventing CPOE. Hanlon has characterized this new push for CPOE as a hoped for way to herald new milestones in safety that has failed miserably. He also raises important points about privacy issues and how privacy has been violated in several documented occurrences, and the public's distrust of data privacy including revelations regarding specific patient's medications and diagnoses continues to increase.

A recent RAND study documented the quality of care concerns among physicians in six states with interviews of 220 physicians and medical administrators found that:

- 1) physicians describe the cumulative burden of rules and regulations as being overwhelming and draining of time and resources away from patient care, and
- 2) that EMRs with CPOE were described as "treadmills" and being "relentless" in limiting time with each patient. These primary care physicians and administrators also noted that issues of collegiality, fairness and respect were key factors affecting physician satisfaction, and too often this is lacking by those in Information Technology or those dedicated to Medical Informatics rather than to patient care.<sup>13</sup>

But, can we do better? Joseph Schulman in his book "Evaluating the Processes of Neonatal Intensive Care" notes that "Daily, we must justify explicitly, objectively, what we do in the neonatal intensive care unit. And increasingly we must demonstrate that these activities provide value for those we serve."<sup>14</sup> John Wennberg called attention to the impact of practice variation, and Leape documented, in an era just preceding the early introduction of the new information technologies, that human and system errors were responsible for nearly 98,000 deaths annually in the U.S.A.<sup>15,16</sup> What medical informatics has not learned from the Cochrane Collaboration of Clinical Trials<sup>17</sup> is that introduction of new systems should rely on the results of randomized clinical trials, or even those using clustered randomization. Incremental introduction of various components of medical informatics should be mandated prior to introducing new technologies as a "total package" that fundamentally alters (or as many would say- disrupts) the processes of care. Batalden attributes this prophetic statement to Donald M. Berwick: "Every system is perfectly designed to achieve the results that it gets."<sup>18</sup> Unfortunately, in its current form, CPOE is difficult to navigate, not evidence-based, and predicated for systematic failures. Clearly, we can do better.

How do we define better? CPOE has been taken away from the physicians. Looking at the core of most healthcare information software, although there are multiple physician advisors, advocates, and aficionados, this software is largely designed by systems integrators who do not have a reasonable understanding of physician workflow. Each physician rounds differently, each physician has individual demands that tax the system. In the name of consistency, many of these variations are eliminated by CPOE. Assuming that all physicians are comfortable with certain prescriptive language produces new and interesting dilemmas. While some physicians may be comfortable describing NIPPV as nasal intermittent positive pressure ventilation, others recognize it as non-invasive positive pressure ventilation. Some, reckoning that this is neither intermittent nor non-invasive in neonates, refer to this as NIMV or nasal intermittent mandatory ventilation. If a physician cannot find the correct order header, he may enter this as SIMV or synchronized intermittent mandatory ventilation or in some other manner communicate the order to the respiratory therapist or nurse. The order may be rejected and the physician may be compelled to order the intervention in a manner that incorrectly describes the procedure. Change can be accommodated, but only through sparse software updates and through committees of "vested" individuals who decide if the change is really warranted. If a physician cannot order a therapy in a language that he sees fit, the integrity of the interaction is compromised and the veracity of the encounter is subject to interpretation.

For the systems to adequately and fairly represent physician practice and practice variation between physicians, another evolution is necessary. Close to 30 years ago, a small software company received tremendous critical acclaim for a product called "Q&A." Q&A was different from software products before it in that it included a natural language interface for data retrieval. Unlike structured query language (SQL) inquiries which incorporated simplified data retrieval techniques, Q&A went one step further. Users could enter normal questions in conventional English prose, and following a confirmatory dialogue, receive meaningful information from their data. Ultimately the company failed; the query engine did not scale well for networks across enterprise or for multidimensional relational databases where most of the world's medical data lived. Siri for the Apple devices and Iris for the Android operating system provide present day examples of software built to incorporate the abilities of innovative devices using natural language interpretive metrics that translate and respond to common day to day requests. But what if we had a natural language engine like Q&A today with 30 years of improved metrics, sized to our network-capable smart phones, and adapted for the most sophisticated relational database models for physician ordering? In addition to the core technologies, we could make use of

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advances in handwriting recognition and voice to text technologies to enhance the order entry experience. A physician could enter an order in any one of a number of contexts including written order, verbal order over the phone with real time voice to text conversion, or even CPOE scripting; and the natural language context of the order would be preserved. The CPOE database would provide the necessary validations in the background, and the provisions for meaningful use would be met. Additionally, as with Q&A, the system would scale with the physician. If the system learned that the physician treated only neonates, it would avoid notifications for adult-based norms. Moreover, because the physician would be able to use a "natural" interface, the requirement to learn five or six different CPOE systems would be eliminated. The physician could get back to the business of caring for the patient. CPOE and other computer-based health charting would derive from the normal daily physician interaction, not impede it. Physicians would be able to break free of their role of a data entry technician, and be able to interact meaningfully with their patient and patient's families, develop a way to allow physicians to continue to practice medicine on their terms, and intelligently parse the medical record for the elements required to achieve "Meaningful Use" compliance, and physician objection to CPOE and electronic medical charting would disappear.

One of clearest thinkers about the essence of reform in healthcare and value driven healthcare is the third term Oregon Governor John Kitzhaber, MD. In healthcare, his goal is to provide a financial incentive for doctors and hospitals to pursue less expensive diagnostic and treatment models, and to spend more time cultivating preventive and primary care relationships

with patients. In his purvey, medical education and the institutions that are involved in this process must encourage educators, parents, students, healthcare providers and community institutions to work together to improve outcomes: it is about recalibrating priorities.<sup>19</sup> Has CPOE created this value in our healthcare system? Could the \$1.1 million dollars spent attributable to an infant's life saved be better used in prevention upstream, rather than downstream on systems that are predicated to fail and increase workload? While the jury may still be out regarding the potential benefits of CPOE, the balance of ease-of-use, justice, value, and physician confidence does not favor the impact of CPOE on value-added, evidence based medicine. Indeed, the opposite is true.<sup>20,21,22,23</sup>

## References

1. Stuart, K. You can't get there from here: misplaced incentives can undermine the goals of healthcare reform in the NICU setting. *J. Perinatol.* 2012 Aug 32(8): 570-3 doi: 10.1038/jp2012.35.
2. Sharek PJ, Classen, D. The Incidence of Adverse Events and Medical Error in Pediatrics. *Pediatr Clin N Am* 2006; 53: 1067-1077.
3. Han YY, Carcillo JA, Venkatarama T. et al Unexpected increased mortality after implementation of a commercially sold computerized physician order entry system. *Pediatrics* 2005; 116: 1506-12.
4. Ammenwerth E, Spöti H-P. The Time Needef for Clinical Documentation versus Direct Patient Care. *Methods Inf Med* 2009; 48: 84-91. ö
5. Poor integration between hospitals EHRs and NICUs. June 6, 2013. Available at <http://runningahospital.blogspot.com/2013/06/poor-integration-between-hopisalt-ehrs.html>.
6. Toll, E. "A piece of my mind. The cost of technology." *JAMA* 2012; 307(23): 2497-2498.
7. Chen PW. An Unforeseen Complication of Electronic Medical Records in Doctor and Patient. *The New York Times.* April 22, 2010.
8. McGrath JM, Arar NH, Pugh JA. The influence of electronic medical record usage on nonverbal communication in the medical interview. *Health Informatics J.* 2007; 13(2): 105-118.
9. Stage 2 Eligible Hospital and Critical Access Hospital Meaningful Use Core Measures Measure 1 of 16 CPOE for Medication, Laboratory and Radiology Orders. Date issued: October, 2012.

[http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/downloads/Stage2\\_HospitalCore\\_1\\_CPOE\\_MedicationOrders.pdf](http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/downloads/Stage2_HospitalCore_1_CPOE_MedicationOrders.pdf).

10. Magrabi, F., et al. "Patient safety problems associated with healthcare information technology: an analysis of adverse events reported to the US Food and Drug Administration." *AMIA Annu Symp Proc* 2011: 853-857.
11. Miller, AR, Tucker, CE. Can Health Care Information Technology Save Babies. *The J. Political Economy* 2011; 119(2): 289-324.
12. Hanlon T. The electronic medical record: diving into a shallow pool? *Cleveland Clinic J Med.* 2010; 77(7): 408-11.
13. Chen, PG, Van Busum KR, Aunon FM, Pham C et al. Factors Affecting Physician Professional Satisfaction and Their Implications for Patient Care, Health Systems, and Health Policy. *RAND.* Available at [www.rand.org](http://www.rand.org) October 9 2013.
14. Schulman J. Evaluating the Processes of Neonatal Intensive Care, 2004 BMJ publishing group, London.
15. Wennberg, JE, Ed *The Center for the Evaluative Clinical Sciences. DMS. The Dartmouth atlas of health care in the United States.* 1998 Chicago, IL: American Hospital Publishing.
16. Leape, L. To Err is Human Building a Better Healthcare System, 2000, National Academy of Sciences, Washington, D.C.
17. *Cochrane Collaboration of Clinical Trials,* McMaster University.
18. Batalden, PB, Morh JJ. Building knowledge of health care as a system. *Quality Management in Health Care* 1997; 5:1-12.
19. Abramsky S. John Kitzhaber's Oregon Dream. *The Nation.* Available at <http://www.thenation.com/article/174473/john-kitzhabers-oregon-dream>.
20. Abelson R, Creswell J: In a Second Look, Few Savings From Digital Health Records. *New York Times,* 2013 Jan 10. "<http://www.aaos.org/news/aaosnow/mar13/advocacy1.asp>" [http://www.nytimes.com/2013/01/11/business/electronic-records-systems-have-not-reduced-health-costs-report-says.html?\\_r=2&](http://www.nytimes.com/2013/01/11/business/electronic-records-systems-have-not-reduced-health-costs-report-says.html?_r=2&).
21. Abelson R, Creswell J: U.S. Warning to Hospitals on Medicare Abuses. 24 Sep 2012. "<http://www.aaos.org/news/aaosnow/mar13/advocacy1.asp>" <http://www.nytimes.com/2012/09/25/business/us-warns-hospitals-on-medicare-billing.html>.

22. Kellerman AL, Jones SS: What It Will Take To Achieve The As-Yet-Unfulfilled Promises Of Health Information Technology. *Health Affairs,* Jan 2013, vol. 32, no. 1: 63-68. <http://content.healthaffairs.org/content/32/1/63.abstract>.
23. Hillestad R, Bigelow J, Taylor R, et al: Can Electronic Medical Record Systems Transform Health Care? Potential Health Benefits, Savings, And Costs? *Health Affairs,* Sep 2005, vol. 24, no. 5: 1103-1117. **H Y P E R L I N K** "<http://content.healthaffairs.org/content/24/5/1103.full>" \ | "sec-21" <http://content.healthaffairs.org/content/24/5/1103.full#sec-21>.

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\* This article was sent to several colleagues of Dr. Mitchell Goldstein who has included their recommended changes in the article.

### Corresponding Author



*Mitchell Goldstein, MD*  
Associate Professor  
Division of Neonatal Medicine  
Department of Pediatrics  
Loma Linda University Children's Hospital  
Loma Linda, CA USA  
Phone: 909.558.7448; Fax: 909.558.0298  
[MGGoldstein@llu.edu](mailto:MGGoldstein@llu.edu)



*T. Allen Merritt, MD, MHA*  
Professor  
Division of Neonatal Medicine  
Department of Pediatrics  
Loma Linda University Children's Hospital  
Loma Linda, CA USA



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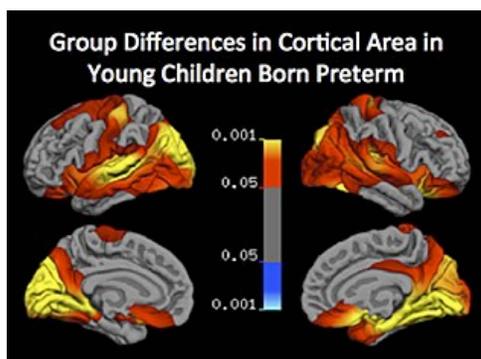
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# Medical News, Products & Information

## Preterm Babies at Risk for Later Cognitive Difficulties

**Newswise** — Researchers at the University of California, San Diego have received a five-year, \$3 million grant from the Eunice Kennedy Shriver Institute of Child Health and Human Development, part of the National Institutes of Health (NIH). The grant will fund a longitudinal study designed to track the developmental trajectory in cognitive, academic and brain measures as very preterm children transition from preschool to grade school. Results will provide the foundation for designing appropriate learning interventions.



“Even healthy preterm babies are at high risk for lower academic achievement, especially in math,” said Natacha Akshoomoff, PhD, of the Department of Psychiatry and UC San Diego’s Center for Human Development.

Preterm children who are deemed “normal” in terms of their development at infant/toddler stages may still remain at risk for significant math difficulties, as well as deficits in attention, executive functions, and spatial skills.

“Recent studies have identified a common pattern of subtle abnormality in the deep white matter of the brain among children born very premature. These early abnormalities may affect the subsequent development of widely distributed brain areas, and may account for the patterns of cognitive deficit that are observed later in childhood,” said Akshoomoff. “However, there is currently very little data actually linking these neural abnormalities with the emergence of such deficits and associated early academic difficulties. The goal of the current study is to provide these essential data as children enter a critical developmental stage when intervention may have the best potential to achieve better outcomes for these children.”

Akshoomoff and a multidisciplinary team of investigators will utilize MRI imaging techniques to study links between affected brain areas and pathways and levels of performance on a set of neurocognitive and math functions. Participants will include 60 healthy children born at 25 to 32

gestational weeks with average intelligence, and 40 full-term children matched for age, sex and verbal IQ. Children will enter the study within six months of entering kindergarten and will be followed for three years. The scientists predict that specific early perceptual and cognitive deficits will be related to math deficits that emerge as children start school.

Their hope is that their results will greatly enhance understanding of why certain skills appear more vulnerable to preterm birth, how this relates to early math deficiency, and how changes seen in the brain account for neurodevelopment outcomes in healthy preterm children.

“This is not meant to frighten parents of children born preterm, but to alert them of potential cognitive or behavior problems that – with early intervention – can be mitigated,” said Akshoomoff.

For more information, <http://chd.ucsd.edu/>.

## Study Examines Adverse Neonatal Outcomes Associated With Early-Term Birth

**Newswise** — Early-term births (37 to 38 weeks gestation) are associated with higher neonatal morbidity (illness) and with more neonatal intensive care unit (NICU) or neonatology service admissions than term births (39 to 41 weeks gestation), according to a study by Shaon Sengupta, MD, MPH, now of the Children’s Hospital of Philadelphia and formerly of the University at Buffalo, N.Y., and colleagues.

Researchers examined data over a three-year period from medical records of 33,488 live births at major hospitals in Erie County, NY, 29,741 at a gestational age between 37 to 41 weeks.

According to study results, 27% of all live births were early-term (birth at 37 to 38 weeks). In comparison with term newborns (birth at 39 to 41 weeks), early-term newborns had higher risks for birth complications, including: hypoglycemia (low blood sugar, 4.9% vs. 2.5%), NICU or neonatology service admission (8.8% vs. 5.3%), need for respiratory support (2.0% vs. 1.1%), and requirement for intravenous fluids (7.5% vs. 4.4%). Cesarean deliveries, common among early-term births (38.4%), posed a higher risk for NICU or neonatology admissions and morbidity compared with term births; NICU or neonatology admission was also more common in vaginal early-term births compared with term newborns.

“We conclude that early-term delivery is associated with greater morbidity and with increased admission to the NICU or neonatology

service in a geographic area-based setting. This increased risk is more profound with Cesarean section deliveries, but exists for vaginal deliveries as well,” the study concludes.

Additional collaborators on the UC San Diego study include: Terry Jernigan (Center for Human Development, Departments of Cognitive Science, Psychiatry, and Radiology); Joan Stiles (Center for Human Development and Department of Cognitive Science); Yvonne Vaucher and Martha Fuller (Neonatology/Pediatrics); Timothy Brown (Neurosciences); Anders Dale (Radiology); Wesley Thompson (Psychiatry); and John Hesselink (Radiology); as well as Judy Reilly (Psychology, San Diego State University); and Janette Atkinson and Oliver Braddick (University College of London and University of Oxford).

(JAMA Pediatr. Published online September 30, 2013. doi: 10.1001/jamapediatrics.2013.2581.

This study was supported by intramural funds from the Division of Neonatology, University at Buffalo, and by an American Academy of Pediatrics Resident Research Grant and the Thomas F. Frawley, MD, Residency Research Fellowship Fund, at the University at Buffalo. Please see the article for additional information, including other authors, author contributions and affiliations, financial disclosures and support, etc.

The study is supported by NIH Grant # 1-R01HD075865-01 A1.

## Listening Matters for Mothers

**Newswise** — For most women, childbirth is an intense experience, culminating in the joy of delivering a newborn, swaddled and sweet, resting in the mother’s arms within hours. Yet for those who deliver their babies prematurely, the experience is bereft of such bonding, laden with anxiety, confusion, and doubt.

“Having a prematurely born baby is like a nightmare for the mother,” explains Lisa Segre, Assistant Professor in the University of Iowa College of Nursing. “You’re expecting to have a healthy baby, and suddenly you’re left wondering whether he or she is going to live.”

These new moms have a tremendous need for help while they’re in the hospital’s neonatal intensive care unit (NICU). So Segre and a longtime NICU nurse, Rebecca Siewert, decided to find out whether women who delivered babies prematurely would benefit from having a nurse sit with them and listen to what they had to say. In a new study, published in the *Journal of Perinatology*, Segre’s research



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Utilize additional therapies to maximize oxygen delivery with validated ventilation systems.

**Reference:** 1. Data on file. Hampton, NJ: Ikaria, Inc; 2013.

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- INOMAX is contraindicated in the treatment of neonates known to be dependent on right-to-left shunting of blood
- Abrupt discontinuation of INOMAX may lead to increasing pulmonary artery pressure and worsening oxygenation even in neonates with no apparent response to nitric oxide for inhalation

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## Brief Summary of Prescribing Information

### INDICATIONS AND USAGE

#### Treatment of Hypoxic Respiratory Failure

INOmax<sup>®</sup> is a vasodilator, which, in conjunction with ventilatory support and other appropriate agents, is indicated for the treatment of term and near-term (>34 weeks) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension, where it improves oxygenation and reduces the need for extracorporeal membrane oxygenation.

Utilize additional therapies to maximize oxygen delivery with validated ventilation systems. In patients with collapsed alveoli, additional therapies might include surfactant and high-frequency oscillatory ventilation.

The safety and effectiveness of INOmax have been established in a population receiving other therapies for hypoxic respiratory failure, including vasodilators, intravenous fluids, bicarbonate therapy, and mechanical ventilation. Different dose regimens for nitric oxide were used in the clinical studies.

Monitor for PaO<sub>2</sub>, methemoglobin, and inspired NO<sub>2</sub> during INOmax administration.

### CONTRAINDICATIONS

INOmax is contraindicated in the treatment of neonates known to be dependent on right-to-left shunting of blood.

### WARNINGS AND PRECAUTIONS

#### Rebound Pulmonary Hypertension Syndrome following Abrupt Discontinuation

Wean from INOmax. Abrupt discontinuation of INOmax may lead to worsening oxygenation and increasing pulmonary artery pressure, i.e., Rebound Pulmonary Hypertension Syndrome. Signs and symptoms of Rebound Pulmonary Hypertension Syndrome include hypoxemia, systemic hypotension, bradycardia, and decreased cardiac output. If Rebound Pulmonary Hypertension occurs, reinstate INOmax therapy immediately.

#### Hypoxemia from Methemoglobinemia

Nitric oxide combines with hemoglobin to form methemoglobin, which does not transport oxygen. Methemoglobin levels increase with the dose of INOmax; it can take 8 hours or more before steady-state methemoglobin levels are attained. Monitor methemoglobin and adjust the dose of INOmax to optimize oxygenation.

If methemoglobin levels do not resolve with decrease in dose or discontinuation of INOmax, additional therapy may be warranted to treat methemoglobinemia.

#### Airway Injury from Nitrogen Dioxide

Nitrogen dioxide (NO<sub>2</sub>) forms in gas mixtures containing NO and O<sub>2</sub>. Nitrogen dioxide may cause airway inflammation and damage to lung tissues. If the concentration of NO<sub>2</sub> in the breathing circuit exceeds 0.5 ppm, decrease the dose of INOmax.

If there is an unexpected change in NO<sub>2</sub> concentration, when measured in the breathing circuit, then the delivery system should be assessed in accordance with the Nitric Oxide Delivery System O&M Manual troubleshooting section, and the NO<sub>2</sub> analyzer should be recalibrated. The dose of INOmax and/or FIO<sub>2</sub> should be adjusted as appropriate.

#### Heart Failure

Patients with left ventricular dysfunction treated with INOmax may experience pulmonary edema, increased pulmonary capillary wedge pressure, worsening of left ventricular dysfunction, systemic hypotension, bradycardia and cardiac arrest. Discontinue INOmax while providing symptomatic care.

### ADVERSE REACTIONS

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice. The adverse reaction information from the clinical studies does, however, provide a basis for identifying the adverse events that appear to be related to drug use and for approximating rates.

Controlled studies have included 325 patients on INOmax doses of 5 to 80 ppm and 251 patients on placebo. Total mortality in the pooled trials was 11% on placebo and 9% on INOmax, a result adequate to exclude INOmax mortality being more than 40% worse than placebo.

In both the NINOS and CINRGI studies, the duration of hospitalization was similar in INOmax and placebo-treated groups.

From all controlled studies, at least 6 months of follow-up is available for 278 patients who received INOmax and 212 patients who received placebo. Among these patients, there was no evidence of an adverse effect of treatment on the need for rehospitalization, special medical services, pulmonary disease, or neurological sequelae.

In the NINOS study, treatment groups were similar with respect to the incidence and severity of intracranial hemorrhage, Grade IV hemorrhage, periventricular leukomalacia, cerebral infarction, seizures requiring anticonvulsant therapy, pulmonary hemorrhage, or gastrointestinal hemorrhage.

In CINRGI, the only adverse reaction (>2% higher incidence on INOmax than on placebo) was hypotension (14% vs. 11%).

Based upon post-marketing experience, accidental exposure to nitric oxide for inhalation in hospital staff has been associated with chest discomfort, dizziness, dry throat, dyspnea, and headache.

### OVERDOSAGE

Overdosage with INOmax will be manifest by elevations in methemoglobin and pulmonary toxicities associated with inspired NO<sub>2</sub>. Elevated NO<sub>2</sub> may cause acute lung injury. Elevations in methemoglobin reduce the oxygen delivery capacity of the circulation. In clinical studies, NO<sub>2</sub> levels >3 ppm or methemoglobin levels >7% were treated by reducing the dose of, or discontinuing, INOmax.

Methemoglobinemia that does not resolve after reduction or discontinuation of therapy can be treated with intravenous vitamin C, intravenous methylene blue, or blood transfusion, based upon the clinical situation.

### DRUG INTERACTIONS

No formal drug-interaction studies have been performed, and a clinically significant interaction with other medications used in the treatment of hypoxic respiratory failure cannot be excluded based on the available data. INOmax has been administered with dopamine, dobutamine, steroids, surfactant, and high-frequency ventilation. Although there are no study data to evaluate the possibility, nitric oxide donor compounds, including sodium nitroprusside and nitroglycerin, may have an additive effect with INOmax on the risk of developing methemoglobinemia. An association between prilocaine and an increased risk of methemoglobinemia, particularly in infants, has specifically been described in a literature case report. This risk is present whether the drugs are administered as oral, parenteral, or topical formulations.

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team writes that pre-term baby mothers who participated in a series of personal sessions with a NICU nurse reported lower anxiety and depression symptoms, while their self-esteem improved.

Segre says it's the first proof-of-concept study conducted that enlisted NICU nurses in "listening visits" with mothers of pre-term infants. The research shows that "listening matters," says Segre, who is a psychologist. "These mothers are stressed out, and they need someone to listen to them," she adds.

Some 15 million babies are born prematurely worldwide, of which one million die, according to the World Health Organization (WHO). In the U.S., more than half a million babies are pre-term each year, WHO reports.

The listening visits concept comes from the United Kingdom, where post-partum mothers are screened in the home for depression. In 2007, the British National Institute for Clinical Excellence recommended the visits as an evidence-based treatment for mild to moderate postnatal depression. Segre found similar, positive results in home visits stateside for full-term infants' mothers in a study published in 2010.

But no one had taken the idea into the NICU, much less had the sessions led by hospital nurses. The closest parallel was a study, published in the journal *Pediatrics* in 2006, which examined whether intervention in the NICU would reduce premature infants' length of stay and better prepare moms and dads to care for the preemies when they took them home. That study did not address mothers' mental and emotional states, and nurses were not involved, Segre says.

Yet the need seems to be there: Last year, a different research team found that when leaving the hospital, 1 in 5 mothers still had elevated depression levels and more than 4 in 10 reported at least moderate anxiety.

The trial at University of Iowa Children's Hospital involved 23 mothers with pre-term infants and ran from 2010 through the first half of last year. The women received an average of five one-on-one sessions lasting about 45 minutes each with Rebecca Siewert, an advanced registered nurse practitioner who has worked in NICUs for three decades and is a co-author on the paper. The mothers chose the setting—their room, an outdoor patio, or the cafeteria. The first sessions generally focused on the birth, in which the women described the emotional roller coaster of giving birth to a baby they hardly saw afterward and whose health was compromised.

"The mothers wanted to tell their birth stories," Siewert recalls. "They wanted someone to understand what it felt like for their babies to

be whisked away from them. They were very emotional."

Subsequent sessions allowed the mothers to focus on themselves and their needs, which many tend to consider subsidiary or perhaps even trivial when compared to their newborns' plight, Siewert maintains.

"A lot of times they suffer in silence because they don't want to sound as if they're weak and not doing well, and because all the focus is on the baby, they become secondary," says Siewert, an associate clinical professor in the College of Nursing.

"But the mother needs to be healthy to be able to take that baby home and for that baby to do well."

The mothers' depression level dropped from a mean of 14.26, considered elevated as measured by the Edinburgh Postnatal Depression Scale, before the listening visits to a mean of 9.00, below the standard for professional help, after the sessions ended. Anxiety levels also fell, from a mean of 16.57 as measured by the Beck Anxiety Inventory to a mean of 9.13, according to the study. Both drops are considered statistically significant, the authors write.

The participants also felt better about themselves and their situation, according to the "Quality of Life, Enjoyment and Satisfaction Questionnaire" they filled out before and after the listening sessions. A follow-up assessment one month after the last listening visit showed further declines in depression and anxiety on average, and higher quality of life feelings.

The trial has sparked debate about whether nurses, rather than mental-health professionals, should be the first line of help for postnatal mothers. Segre acknowledges the study is preliminary and would like to test the results in a larger randomized controlled trial.

Still, she and Siewert think nurses are well-suited for the job.

"Listening is what nurses have done their whole career," Siewert says. "We've always been the ones to listen and try to problem solve. So, I just think it was a wonderful offshoot of what nursing can do. We just need the time to do it."

Michael O'Hara, Professor in the Psychology Department at the UI, and Rebecca Brock, Post-Doctoral Research Scholar in Psychology at the UI, are contributing authors on the paper.

The UI's Office of Vice President for Research and Economic Development funded the research through the social science funding program. Segre was supported by funding from

the National Institutes of Health (grant number: MH 075964) during the study.

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### **UCSF Receives \$4.5M to Study Value of Gene Sequencing in Newborns Project with UC Berkeley and Buck Institute Will Assess Accuracy, Ethics**

Newsweek - UC San Francisco will receive \$4.5 million over the next five years for a pilot project to assess whether large-scale gene sequencing aimed at detecting disorders and conditions can and should become a routine part of newborn testing.

The study is one of four projects launched today by the National Institutes of Health to identify the accuracy and feasibility of providing genetic sequencing as part of, or instead of, the current newborn screening that relies on biochemical changes in the blood. It also will assess what additional information would be useful to have at birth and the ethics and public interest in having such tests performed.

"Genomic sequencing has the potential to diagnose a vast array of disorders and conditions at the very start of life," said Alan E. Guttmacher, MD, Director of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), which is jointly funding the studies. "But the ability to decipher an individual's genetic code rapidly also brings with it a host of clinical and ethical issues, which is why it is important that this program explores the trio of technical, clinical, and ethical aspects of genomics research in the newborn period."

The pilots are a core element of the emerging field of precision medicine, which aims to harness vast amounts of genetic and health data to create predictive, preventive and precise care for patients on an international scale. Doing so has the potential to transform medicine, but there are many logistical and ethical hurdles to resolve along the way.

The UCSF team, which also includes bioinformatics experts at UC Berkeley and the Buck Institute for Research on Aging, will study the potential of sequencing the exome - the roughly 2% of DNA that represents genes which code for proteins - as a method of newborn screening. The research will look at the exome's potential for identifying disorders that California currently includes in the newborn screen, as well as those that are not currently screened for, but for which newborns may benefit if detection can occur early in life.

The UCSF research will examine the issue from three vantage points. The first will be a partnership with the California Department of Public Health (CDPH) to test blood drops previously collected from 1,400 children statewide who received standard newborn screening, to

determine whether exome sequencing would be more accurate and also whether it provides insights that could lead to improved newborn screening, care and treatment.

"My hope is that this will give us solid information on the specificity of gene testing, versus standard biochemical testing, for the disorders we are already screening for," said Robert Nussbaum, MD, who leads the UCSF Division of Medical Genetics and holds the Holly Smith Distinguished Professorship in Science and Medicine at UCSF. "In addition, some of the disorders we pick up during screening are chemical abnormalities, but we don't know whether they will actually cause problems for the child. We'd like to know whether there is something in the children's genes that determines whether these abnormalities actually will cause disease."

The second project will offer genetic testing to patients in a UCSF immune system disorders clinic run by Jennifer Puck, MD, a pediatrician in the UCSF Benioff Children's Hospital whose research laboratory pioneered the current newborn test for Severe Combined Immunodeficiency (SCID). Parents will be asked to give informed consent for this arm of the project.

While there are several known genetic mutations that lead to the immune disorder, Puck's original test simply looks at a marker of whether children lack the immune cells known as T lymphocytes, which are missing in SCID. This new project will enable the team to assess whether exome sequencing works as well or better than the current test in identifying SCID, as well as other immune system abnormalities that the current test does not cover. Exome sequencing may also give parents information on the genetic basis of their child's disease.

"Although new tests can benefit affected infants, extra tests cost money and will have false positives in some patients that cause both anxiety for parents and extra testing for the child," Puck said. "The question in this grant is whether we could look at the DNA and see whether it's more accurate in testing for these diseases. That's the promise of genomic technology, but putting it into practice may not be so easy."

The third arm of the project will offer parents genetic testing for newborns at the UCSF Benioff Children's Hospital to assess whether the child is likely to have adverse reactions to

medications based on their genetics - an area known as pharmacogenomics. That portion will be conducted in conjunction with renowned UCSF ethicist Barbara Koenig, PhD, who will be studying parent's attitudes regarding testing children beyond what is currently offered in newborn screening.

While the first two projects are mainly looking at whether genetic testing would be more accurate, specific and useful than current methods, this third element assesses how willing parents are to get genetic information about their child that may be useful later in life, but not right away.

"So far, newborn screening programs have not been directed towards just letting people know about a possible disease risk. There has to be a high probability of serious illness that can be prevented with early intervention," Nussbaum said. "Pharmacogenomics is perhaps the most acceptable of tests that imply potential risk. There's very little risk, and the possibility of great benefit, to knowing whether you will react to a drug or an anesthetic, and the only way to find out besides genetic screening is if you're in the operating room or have filled a prescription and you have a bad reaction."

The research team also intends to develop a participant protection framework for conducting genomic sequencing during infancy and will explore legal issues related to using genome analysis in newborn screening programs. Together, these studies have the potential to provide public health benefit for newborns and research-based information for policy makers.

Additional researchers on the project include Neil Risch, PhD, Director of the UCSF Institute of Human Genetics; Pui-Yan Kwok, MD, PhD, UCSF Professor of Dermatology whose research focuses on analysis of complex genetic traits; and Joseph Shieh, MD, PhD, Assistant Professor of Pediatrics and Medical Genetics. Sean Mooney, PhD, a bioinformatics expert at the Buck Institute for Research on Aging, and Steven Brenner, PhD, Professor of Plant and Microbial Biology at UC Berkeley and Adjunct Professor at UCSF, will contribute their expertise in bioinformatics to the project.

The four NIH pilots, which also include Brigham and Women's Hospital in Boston, Children's Mercy Hospital in Kansas City, and the University of North Carolina at Chapel Hill, will receive \$25 million over the next five years as funds are made available through the NICHD and the National Human Genome Research Institute,

both parts of the National Institutes of Health. This year's grants were made under the Genomic Sequencing and Newborn Screening Disorders research program.

## Big Data Reaps Big Rewards in Drug Safety Systems

Newswise - Using the Food and Drug Administration's Adverse Event Reporting System (FAERS), a hospital electronic health records database, and an animal model, a team of researchers at the Icahn School of Medicine at Mount Sinai report that by adding a second drug to the diabetes drug Rosiglitazone, adverse events dropped enormously. That suggests that drugs could be repurposed to improve drug safety, including lowering the risk of heart attacks.

The research was published online October 9<sup>th</sup> in the journal *Science Translational Medicine*.

The approach is part of an emerging strategy known as systems pharmacology that integrates computer science, mathematical models, and animal models to examine how drugs work in cells.

Systems pharmacology shows that most drugs act by binding to targets that are part of complex networks within cells.

"Big data systems have a wealth of data, and when studied appropriately, can point to potentially safer combinations," said the study's lead author, Ravi Iyengar PhD, Dorothy H. and Lewis Rosenstiel Professor, Department of Pharmacology and Systems Therapeutics, and Director, Systems Biology Center, at the Icahn School of Medicine at Mount Sinai. "As an end in themselves, big data analyses must be considered preliminary, but findings can point to potentially safer combinations that can subsequently be tested in clinical trial," said Dr. Iyengar. "We may be able to use FDA-approved drugs to prevent adverse events."

In this study, investigators studied how drug combinations act through networks within cells, focusing on the diabetes drug Rosiglitazone, an effective drug in controlling blood glucose. However, Rosiglitazone has a serious side effect, increased heart attacks, which has restricted its use markedly.



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## BRAIN & MONITORING & NEUROPROTECTION IN THE NEWBORN

January 16-18, 2014

[www.tinyurl.com/Brain2014-webpage](http://www.tinyurl.com/Brain2014-webpage)

The 8th International Conference on Brain Monitoring and Neuroprotection in the Newborn is intended to bring the most current and important research in these fields to a forum where the results can be translated for use by clinicians. Brain monitoring, for the purposes of this conference, is defined as those methods used on a continuous or repetitive basis to assess brain function in the newborn such as continuous EEG or near-infrared spectroscopy (NIRS). Neuroprotection, for the purposes of this conference, is defined as therapeutic hypothermia as well as any adjunctive measures that may be utilized along with it.

While these definitions are somewhat restrictive and will be stretched from time to time to include subjects of compelling interest, we think it is important to maintain a focus on these two closely-related and clinically-evolving areas. Broader neonatal neurology topics are available elsewhere, and a broadening of our scope would inevitably lead to a dilution of our focus. The *raison d'être* of this meeting lies in the fact that neither researchers nor clinicians interested in learning the state of the art can find the whole of either field discussed consistently in any other place and to do so seems crucial to us at a time when both fields are growing rapidly in both the research and clinical arenas.

The conference is designed so that researchers and clinicians can derive a solid sense of the state of the art. In building bridges between research and clinical applications, it is vital that the foundations on either side of the bridge are clearly understood. This conference is intended to describe and strengthen those foundations, as well as provide an international bridge between them.

## The Gravens Conference

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The 27th year of the Gravens Conference provides us with an opportunity to explore the current state of neonatal care and to envision a future that best supports the high-risk infant, the family and the team of professionals assisting in the baby's care.

Over the past quarter century, neonatal care providers have worked tirelessly to mitigate the stress experienced by neonates, parents and providers. Doing so has involved change and its inherent struggles, but eventually we have come through the process by adapting our NICU culture, policies and approach. With the promotion of evidence-based knowledge in neurodevelopmental science, developmental care, healthcare design, and family support at the annual Gravens Conference, we endeavor to nurture the developmental needs of babies and the emotional and informational needs of their parents.

Join us in Clearwater Beach, Florida, in February of 2014 to continue our research, learning and practice as we examine ***Nurturing and Nourishing in the NICU***. The most current science, state-of-the-art research and leading practices will be presented in three key conference tracks: developmental care, healthcare architecture and design, and family support.

# NEONATOLOGY TODAY

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Since most patients with diabetes take more than one drug and the FDA Adverse Event Reporting System (FDAERS) is freely available, investigators analyzed data from the FDAERS to see if second drugs could lower the rate of heart attacks. In addition, investigators compared their results with

Mount Sinai's electronic health records system.

Compared with many other commonly used second drugs, "we found that the drug Exenatide, often given along with Rosiglitazone to get better control of blood glucose, also very substantially reduced the heart attack rate in Rosiglitazone users," said Dr. Iyengar. Using these findings, the investigators made some predictions of how these beneficial drug interactions might work in diabetic mice, finding that the heart attack rate declined.

"The beneficial effects of Rosiglitazone and Exenatide are not unique," explained Dr. Iyengar. "We found nearly 19,000 other drug combinations in the FDA database, where the second drug appears to reduce a wide range of side effects of the first drug. Other beneficial effects were demonstrated when Lisinopril was added to a statin, where the rate of statin-associated rhabdomyolysis, a kind of muscle tissue wasting, declined; when an H2 antagonist was added to SSRIs, it reduced completed suicide.

The research team stressed that the results are a valid starting point for developing clinical trials of safer drug combinations. To further drug safety, they urge researchers and clinicians to contribute to big databases, such as the Food and Drug Administration's Adverse Event Reporting System.

The research was supported by the National Institute of General Medical Sciences: NIGMS (grants GM071558, and GM 007280) of the National Institutes of Health.

Co-authors include: Evren U. Azeloglu, PhD; Juan J. Badimon, PhD; Ludovic Benard, PhD; Yibang Chen, PhD; Chiara Giannarelli, MD, PhD; Joseph Goldfarb, PhD; Omri Gottesman, PhD; Roger J. Hajjar, MD, PhD; Mohammad U. Zafar, MD; and Shan Zhao, PhD from the Icahn School of Medicine at Mount Sinai; and Tomohiro Nishimura, PhD, from Keio University, Tokyo, Japan.

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### Publication Headquarters

8100 Leaward Way  
PO Box 444  
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[www.NeonatologyToday.net](http://www.NeonatologyToday.net)

### Editorial and Subscription Offices

16 Cove Rd, Ste. 200  
Westerly, RI 02891 USA

### Publishing Management

- Tony Carlson, Founder, President & Senior Editor - [TCarlsonmd@gmail.com](mailto:TCarlsonmd@gmail.com)
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