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16 Cove Rd., Ste. 200
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Company Offices:

11502 Elk Horn Dr., Ste. 201
Clarksburg, MD 20871 USA
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PediNotes™ – Using Interoperability to Improve Care in the NICU

By Steven B. Spedale, MD, FAAP; Jason M. Fox, BS, MS

The first generation of Neonatal EMRs (Electronic Medical Records) appeared in the 1990s as stand-alone programs and enabled providers to electronically generate patient documentation and track patient outcomes more efficiently. As hospitals have moved to a single software platform for all providers, neonatal caregivers have been pressured to adopt a hospital's single platform, which may not necessarily focus on neonates. With the advancement of technology, there are now opportunities to harness interoperability to integrate a neonatology-designed EMR with a hospital EMR. Interoperability is defined as the ability of two or more systems or components to exchange information and to use the information that has been exchanged.¹ In this win-win situation, both sides stand to benefit; hospitals are able to meet criteria for meaningful use, as well as having access to clinical data previously housed in a stand-alone neonatal EMR, and neonatal providers can use software designed specifically around how they care for their patients.

PediNotes™ (www.PediNotes.com) is an EMR developed for neonatal and pediatric care; designed to work how a clinician works. It uses HL7 interoperability to combine data from multiple sources, and presents this data to the end-user in real time, while providing mechanisms for generating outputs (patient documentation, Computerized Provider Order Entry (CPOE)) to hospital EMRs. HL7 provides a standard for software development which vendors can adhere to for healthcare information exchange.² PediNotes™ has evolved from initially consisting of several add-on software enhancements to other EMRs, into a complete EMR for neonatologists, pediatricians, pediatric subspecialists and ancillary providers in the NICU (Neonatal Intensive Care Unit) and Well Newborn Nursery. PediNotes™ received its first certification as a modular inpatient EMR in 2013.³

A brief review of the neonatal literature reveals a consensus list of functionalities that an ideal neonatal EMR would contain.⁴⁻⁶ This list includes:

1. Integration with existing hospital EMRs
2. Neonatologist-designed in order to focus on neonatal providers' workflow in the NICU

3. Software functions that capture the spectrum of neonatal disease, including those based on chronological and postmenstrual age
4. Document generation and billing integration
5. Sharing of data with clinicians, hospital administration and electronic databases

PediNotes™ aims to usher in the next generation of Neonatal EMRs with a focus on interoperability to enhance existing hospital EMRs and assist the neonatal provider in the provision of care to their patient.

Integration with Existing Hospital EMRs

The American Recovery and Reinvestment Act (ARRA) of 2009 provides for incentive payments beginning in federal fiscal year (FY) 2011 for eligible hospitals (including eligible small, rural hospitals) and Critical Access Hospitals (CAHs) that adopt a certified Electronic Health Record (EHR) system and are meaningful users of certified EHR technology.⁷ This helped spur the rapid adoption of EHRs in hospitals. With payments ending in FY 2016, eligible hospitals and CAHs that do not successfully demonstrate meaningful use of certified ER technology are subject to Medicare payment adjustments.⁸

The Health Information Technology for Economic and Clinical Health (HITECH) Act was enacted as part of ARRA and stimulated significant health information technology (Health IT) adoption and exchange of electronic health information with the goal of every American having access to their electronic health information, and where providers have a seamless ability to securely access and use health information from different sources. The Office of the National Coordinator for Health IT's overarching goal for electronic health information exchange is for information to follow a patient where and when it is needed, across organizational, health IT developer and geographic boundaries.⁸

PediNotes™ incorporates interoperability both in clinical data exchange, as well as CPOE. This has allowed PediNotes™ users to work in a single neonatal-focused software platform in the NICU, while integrating with the hospital's EMR. On a day-to-day basis, PediNotes™ interoperability provides many advantages:

- Patients can be pre-admitted into PediNotes™ using the hospital ADT information.

EVIDENCE-BASED WEBINAR

Early Inhaled Nitric Oxide and Progression of Hypoxic Respiratory Failure (HRF)

View the webinar on-demand at
INOMAX.com/earlyino

Created by practitioners, for practitioners.

Review various elements of HRF treatment, including:

- Acute HRF in newborns
- The pathophysiology of HRF
- Optimizing oxygenation in HRF
- Evidence for the earlier use of inhaled nitric oxide in the treatment of HRF



Satyan Lakshminrusimha, MD
Chief, Division of Neonatology
Women and Children's
Hospital of Buffalo



Ashley Darcy Mahoney, PhD, NNP-BC
Neonatal Nurse Practitioner,
South Dade Neonatology
Assistant Professor,
Emory University School of Nursing

Indication

INOMAX is indicated to improve oxygenation and reduce the need for extracorporeal membrane oxygenation in term and near-term (>34 weeks gestation) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension in conjunction with ventilatory support and other appropriate agents.

Important Safety Information

- INOMAX is contraindicated in the treatment of neonates dependent on right-to-left shunting of blood.
- Abrupt discontinuation of INOMAX may lead to increasing pulmonary artery pressure and worsening oxygenation.
- Methemoglobinemia and NO₂ levels are dose dependent. Nitric oxide donor compounds may have an additive effect with INOMAX on the risk of developing methemoglobinemia. Nitrogen dioxide may cause airway inflammation and damage to lung tissues.
- In patients with pre-existing left ventricular dysfunction, INOMAX may increase pulmonary capillary wedge pressure leading to pulmonary edema.
- Monitor for PaO₂, inspired NO₂, and methemoglobin during INOMAX administration.
- INOMAX must be administered using a calibrated INOMax DS_{IR}[®] Nitric Oxide Delivery System operated by trained personnel. Only validated ventilator systems should be used in conjunction with INOMAX.

Please see Brief Summary of Prescribing Information on adjacent page.



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INOmax[®] (nitric oxide gas)

Brief Summary of Prescribing Information

INDICATIONS AND USAGE

Treatment of Hypoxic Respiratory Failure

INOmax[®] is indicated to improve oxygenation and reduce the need for extracorporeal membrane oxygenation in term and near-term (>34 weeks) neonates with hypoxic respiratory failure associated with clinical or echocardiographic evidence of pulmonary hypertension in conjunction with ventilator support and other appropriate agents.

CONTRAINDICATIONS

INOmax is contraindicated in neonates 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 (NO₂) forms in gas mixtures containing NO and O₂. Nitrogen dioxide may cause airway inflammation and damage to lung tissues.

If there is an unexpected change in NO₂ concentration, or if the NO₂ concentration reaches 3 ppm 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 NO₂ analyzer should be recalibrated. The dose of INOmax and/or FiO₂ should be adjusted as appropriate.

Worsening 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.

DRUG INTERACTIONS

Nitric Oxide Donor Agents

Nitric oxide donor agents such as prilocaine, sodium nitroprusside and nitroglycerine may increase the risk of developing methemoglobinemia.

OVERDOSAGE

Overdosage with INOmax is manifest by elevations in methemoglobin and pulmonary toxicities associated with inspired NO₂. Elevated NO₂ may cause acute lung injury. Elevations in methemoglobin reduce the oxygen delivery capacity of the circulation. In clinical studies, NO₂ 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.

INOMAX[®] is a registered trademark of INO Therapeutics LLC, a Mallinckrodt Pharmaceuticals company.

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Figure 1.

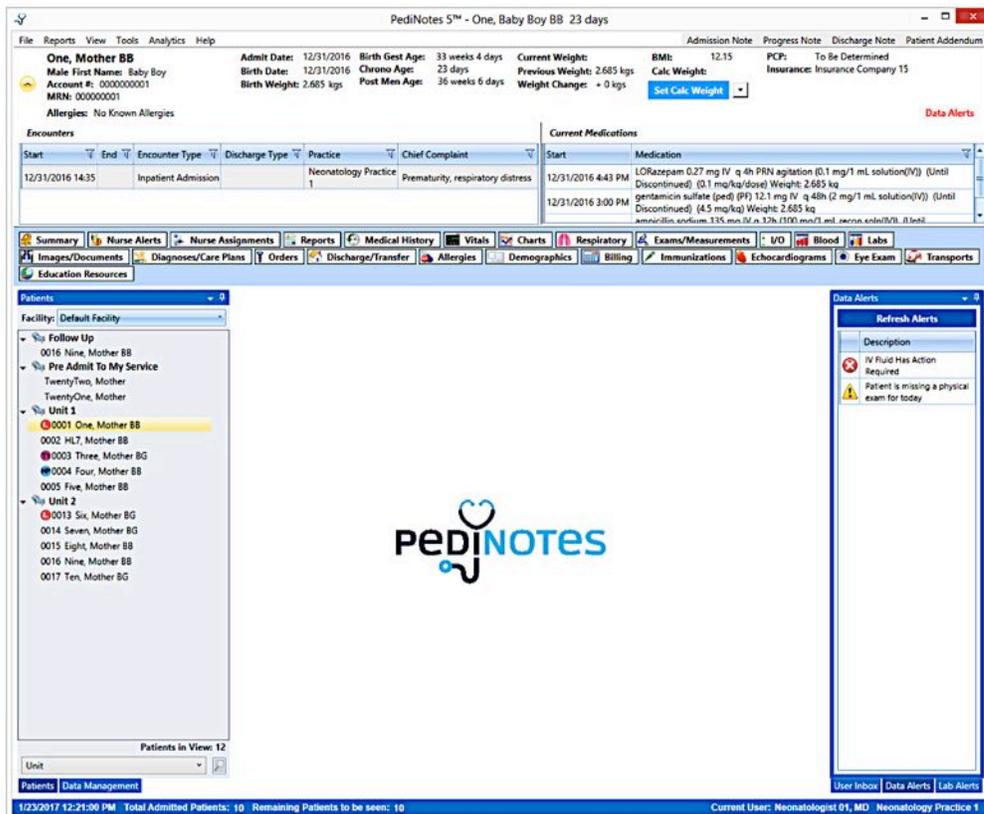


Figure 2.

- Nursing documentation for both maternal and neonatal patients can be downloaded/viewed in PediNotes™.
- Radiology images/reports, consultant reports, and operative reports created in a hospital's EMR can be viewed in-program.

- Physician orders placed in PediNotes™ are integrated into the hospital's EMR.

PediNotes™ captures information from multiple sources, and provides the ability to generate patient documentation, CPOE,

export clinical data, and perform financial functions (Figure 1).

With much of the data provided from external sources, the clinician is able to focus on his/her workflow rather than data entry.

PediNotes™ provides the ability to capture other HL7 information even though it may not be contained with PediNotes™. This is achieved through an in-program tool, which allows an end user to view HL7 in a readable format. An example of this might be a new scoring system (maternal or neonatal) present in the hospital EMR that is not in PediNotes™ currently, but that neonatal providers would be interested in reviewing.

Neonatology Designed/Focus on Neonatal Providers' Workflow

Assimilation of patient data can be inefficient due to the data often residing in multiple locations or software systems. Patient data can be numeric (i.e. vital signs), as well as non-numeric (i.e. x-rays or dictated reports). The capture, organization and presentation of data is paramount in maximizing a provider's efficiency.

PediNotes™ utilizes a user-centered design (Figure 2) with a strong emphasis on displaying clinical data in a format that enhances a clinician's ability to focus on critical information. There is a careful balance between providing the full clinical

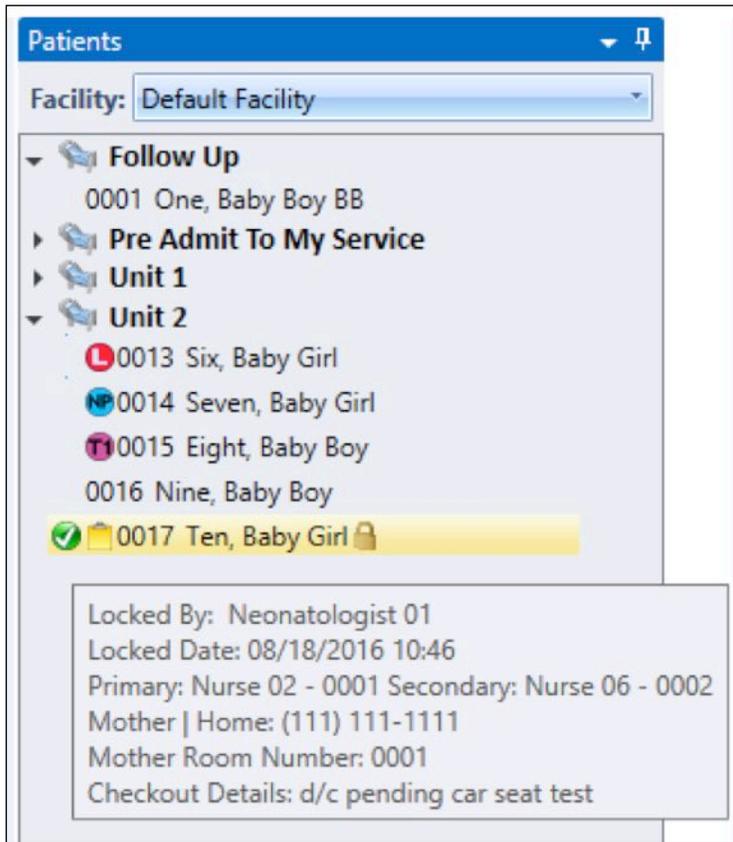


Figure 3.

picture, but not overwhelming a user with too much information at once, often resulting in alert fatigue.

PediNotes™ contains a patient list that displays patients requiring post-discharge follow-up, daily discharged patients, patients not yet admitted to the NICU, and patient location. The patient list also aggregates patient information from other users of PediNotes™, as well as external sources and displays this information as icons or tooltips (Figure 3). This includes availability of: laboratories for review, team assignments (teaching, nurse practitioner, nursing, respiratory therapy), completion of patient documentation by the primary team, as well as consultants, notification when the patient's record is in use by another user, team member communication and maternal information. When other providers enter information into PediNotes™, a visual key appears to inform the care team of data availability. Real-time information from the entire care team improves overall care and efficiency.

Additional clinical data is presented in the User Inbox, including a listing of patients with notes requiring cosignatory, verbal orders requiring signatures, lab alerts, and receipt of Transition of Care documents. User-defined Clinical Decision Support (CDS) is also shown in the user inbox (Figure 4). Common CDS uses designed for neonatology include:

- Diagnosis needing modification based on age/weight (incorrect birthweight codes, codes requiring modification after Day of Life 28).
- Missing required ophthalmology consultation for infant at risk of Retinopathy of Prematurity.
- Missing labs for infant at risk of congenital hypothyroidism.
- Notification of infant's risk for significant jaundice.

These clearly visible sections and icons make actionable patient information easy to locate with little effort to the end-user. Having the

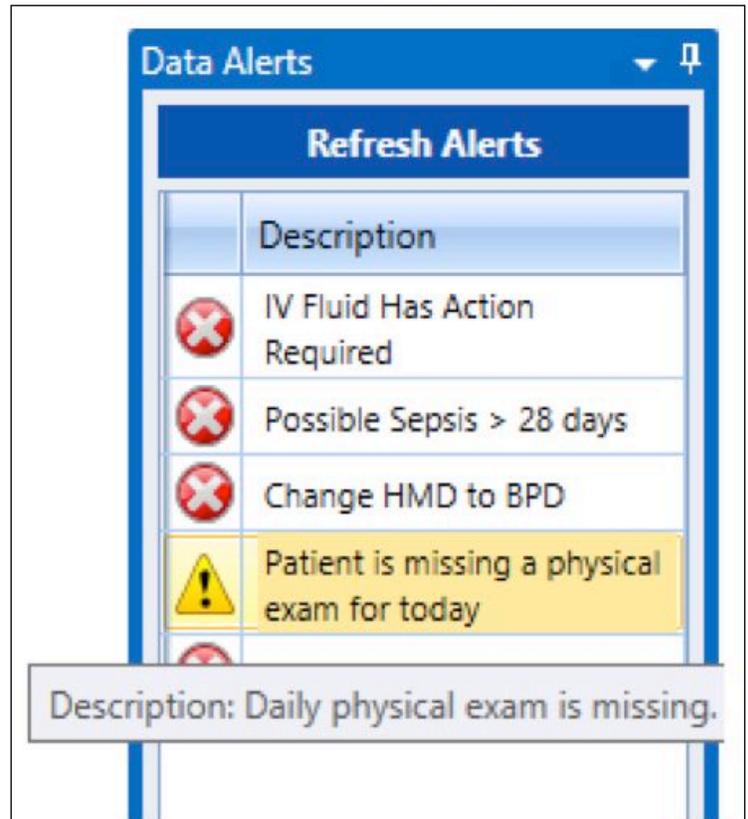


Figure 4.

most important information readily available means a caregiver can focus on patient care, without spending the time to decipher or locate data.

PediNotes™ utilizes visual alerts in the program, as well as notifying caretakers via smart devices utilizing PediNotes™ Mobile, an interactive website which allows for two-way communication between nursing staff and neonatal providers. Bedside nurses receive acknowledgements when a patient's medical provider has reviewed laboratory values. This communication has decreased phone calls regarding laboratory results. Two-way communication regarding STAT CPOE also is possible when the nursing team is equipped with a notification device. Secure text messages with order details are sent to the bedside nurse when the medical provider submits a STAT order.

PediNotes™ functions increase both the medical and nursing teams' efficiency, as well as improves patient safety. Utilizing this function, NICUs have instituted a policy which states that a nurse or respiratory therapist is to contact the patients' medical team if no acknowledgement of a critical lab value is received within an allotted time.

Software Functions that Capture the Spectrum of Neonatal Disease

NICU patients are not "small adults," and many EMRs do not include neonatal-specific functions that are required for treatment of NICU and Well Newborn patients. PediNotes™ contains sections that focus on areas most important to a neonatal provider, which cannot be easily accomplished by hospital EMRs.

- **Neonatal-Focused Admission Process:** User-defined diagnosis and plan templates, based on common neonatal conditions at different gestational ages. Demographics that reflect birth information, body measurements in both metric and English systems, age in hours/weeks/months/years for both chronological and postmenstrual age.

- **Patient Summary Snapshot:** User-defined snapshot with focus on key NICU information such as current and historical respiratory status, current medications and nutritional status, current and resolved diagnoses and procedures.
- **Maternal History:** Pregnancy and birth data imported from hospital nursing documentation, which includes: maternal diagnoses, maternal labs, labor and delivery characteristics, and patient Apgar scores.
- **Medical History:** User-defined Review of Systems, Surgical History, Family History and Past Medical History.
- **Vitals:** Vital signs including invasive monitoring, as well as Apnea/Bradycardia from nursing documentation, bedside monitors and manual entry.
- **Charts Pertinent to Newborns:** Multiple premature growth charts including: corrected growth, intrauterine growth, bilirubin curves with risk stratification, as well as user-defined custom charts.
- **Respiratory:** Current and historical respiratory support, blood gases values and CPOE for respiratory orders.
- **Exams/Measurement:** User- and specialty-defined exam templates, imported and manual growth parameters, growth velocity (g/kg/day) and average weight gain/day (g/day).
- **Neonatal I/O:** Enteral and parental fluids with in-program nutritional calculations for both. Neonatal-specific feeding routines and routes, TPN templates, bolus and replacement IV fluids, and detailed patient output with calculations normalized to body weight. CPOE for all fluids.
- **Diagnoses/Care Plans/Attending Notes:** Diagnosis-specific CPOE, including custom medication formulary based on weight/gestational age/post menstrual age with drug-drug, drug-allergy interaction checking. Specialty-specific procedures with user-defined templates for procedure notes, results of screening procedures (hearing/oxygen saturations/newborn metabolic screen).

- **Echocardiogram:** ECHO worksheet for Pediatric Cardiology with report generator.
- **ROP:** Retinal diagrams allowing in-program documentation for Pediatric Ophthalmology.
- **Transports:** Tracking tool for transports including third party transports.

Document Generation and Billing Integration

As there are multiple providers in the NICU, documentation needs vary. PediNotes™ provides means for all providers to generate the documentation they need specific to the type of care they provide.

Standard patient documents include: admission, progress notes, transfer notes, interim summary, procedure notes, addendum notes, consult (maternal and neonatal) and discharge notes for the primary care team. Procedure notes utilize user-defined templates, which are completed at the time of the procedure. Documents requiring cosignatories are created and have special functions, which allow an attending to return the note to the original author for editing with specific areas identified for correction. Subspecialty support includes: initial and subsequent consult documentation, ECHO reports and retinal diagrams. All reports are integrated into the hospital's EMR electronically.

Physician billing for all aspects of neonatal patient care is available (Figure 5). Complete CPT® and ICD-10 codes are included in the billing module. Users may create both diagnosis and procedure filters, which contain commonly used codes to accelerate the billing process. A patient's diagnoses are also displayed to the end user, with the ability to search ICD-10 as needed. The previous day's billing is displayed for comparison.

The screenshot shows a billing software interface. On the left, there is a 'Practice Procedure Filter' with categories like 'Level II Daily Codes', 'Well Baby', 'Delivery Attendance and Procedures', 'Consults', and 'Procedures'. Below this is a 'Procedure Search' field with the value '99472' and a 'Search' button. A table shows the selected CPT code: 99472, 'Subsequent inpatient pediatric critical care, per day, for the evaluation and management of a critically ill infant or young child, 29 days through 24 months of age'. On the right, there is a 'View ICD10-CM TABULAR LIST of DISEASES and INJURIES' window with tabs for 'Patient Diagnoses' and 'All ICD Diagnoses'. It displays a list of ICD-10 codes and descriptions, including I49.9, P83.9, L30.9, Z01.10, Z23, Z13.4, Z13.228, Z13.858, Z13.29, P59.0, P00.2, P04.9, P00.89, P28.4, P07.16, P81.8, and P25.1. At the bottom, there is a 'Billing Date' field set to '12/9/2016', a 'Billing Physician' dropdown set to 'Neonatologist 10', and a 'Billing Comment' field. A table at the bottom left shows billing data for the selected code.

Edit	Delete	CPT®	ICD	Billing Weight	Billing Physician
		99472	Z13.858	1.620	Neonatologist 10

Figure 5.

The billing module utilizes user-defined rules that are unique to neonatology (or other specialties), and include age based, weight based and clinical status criteria. Users are presented with CDS that may be accepted or overridden. Use of these rules results in more uniformed billing. Provider billing may be exported utilizing HL7 to a third party billing system.

Sharing of Data with Clinicians, Hospital Administration and Electronic Databases

Real-time information is key to providing good care, and software that does not allow the end-user access to instant data retrieval puts the provider at a disadvantage. A basic premise of PediNotes™ design is sharing of data between all providers of an infant's care. In the era of "Big Data," emphasis on population health is paramount, and the population health of NICU patients is no different. Neonatal population health will take on more emphasis as payors move towards at-risk contracts. PediNotes™ is designed such that there is automatic linking of all physician orders to a specific diagnosis. Diagnosis-CPOE linkage allows for the analysis of clinical management and

utilized resources for not only the entire patient stay, but also specific disease states.

PediNotes™ utilizes an integrated analytics tool, PediAnalytics, for real-time data retrieval and analysis. PediAnalytics was designed for the clinician who wants to quickly ask their own questions about their patients, without having to submit a data request nor possess knowledge of how to query a database. The tool gives end-users the ability to create unlimited data conditions and return patient information in the following key areas:

- admission and discharge characteristics
- patient demographics
- diagnoses
- respiratory parameters
- medications
- laboratory
- procedures

PediNotes™ data can also be coupled with Microsoft Power BI or other data visualization tools. Information dashboards can be created that can be shared throughout the institution. (Figure 6)

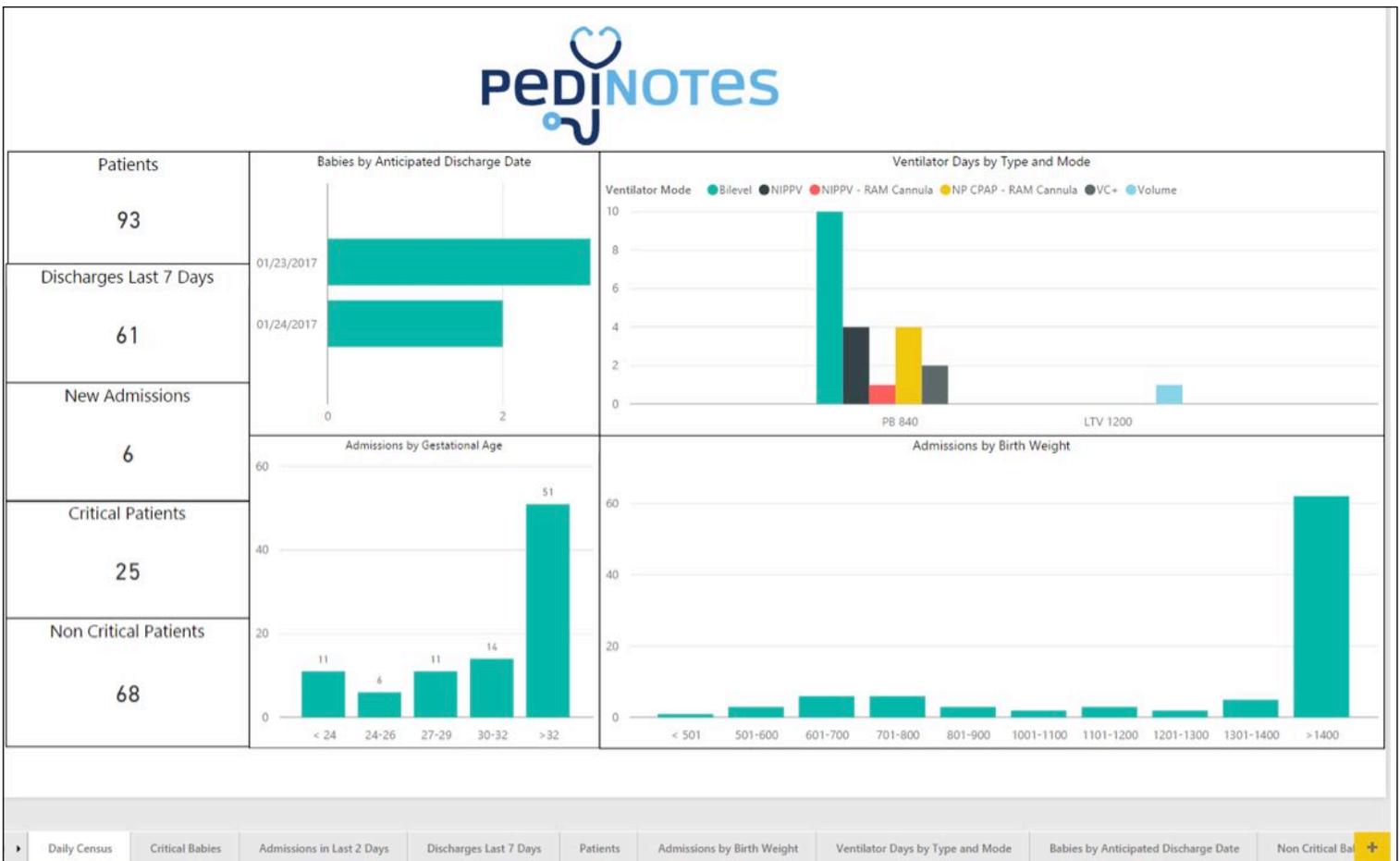


Figure 6

Barth Syndrome (ICD-10: E78.71)

Symptoms:
**Cardiomyopathy, Neutropenia, Muscle Weakness,
 Exercise Intolerance, Growth Delay, Cardiolipin Abnormalities**

www.barthsyndrome.org

Current uses include: daily census with infant demographics and ventilator support, real time tracking of Vermont Oxford Key Performance measurements, and NICU maps that show the location of critical/non-critical patients.

Quality Control reports allow for PediNotes™ to contain better data. Reports in use search for key comments in patient diagnoses to verify data entry, tracking of physician and nursing acknowledge response time to critical lab values and verbal orders, identification of missed patient billing, patient line days, patient ventilator days, procedures by providers, patient location history and transport demographics. Users of these types of reports include: Infection Control, Utilization Management and Health Information departments.

PediNotes™ contains a Vermont Oxford Network export function, which extracts the required information for entry into eNICQ 5.¹⁰ The data extracted is information users have already entered into PediNotes™ during the normal process of caring for patients. A first-pass data extraction success rate is currently 95% from PediNotes™ to eNICQ 5. This approach yields a significant Return on Investment (ROI), especially when hospitals often have full-time staff dedicated to manually inputting this data.

Summary

PediNotes™ represents the next generation of neonatal EMRs. It harnesses interoperability to allow neonatal providers to work in a software program designed for them, but also integrates with a hospital EMR. Clinicians often struggle to fit this information into adult EMRs. PediNotes™ excels in capturing neonatal data, while still providing the outputs necessary to satisfy requirements in the hospital EMR.

Data exchange between providers and systems involved in the care of an infant is streamlined and results in a provider's efficiency and satisfaction. Real time data analysis provides results when needed and mobile functionality allows clinicians to remain in contact with the NICU at all times. Quality Improvement is made easier with defined data reports and automated exports to databases. The dissemination of clinical data is simplified with visual dashboards. The goal of PediNotes™ is to provide the means for neonatal caregivers to have what they need to care for the NICU patient.

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“PediNotes™ represents the next generation of neonatal EMRs. It harnesses interoperability to allow neonatal providers to work in a software program designed for them, but also integrates with a hospital EMR.”

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Corresponding Author



Steven B. Spedale, MD, FAAP
President
TecuroLogic, LLC
Chief of Neonatology
Woman's Hospital Baton Rouge and
Ochsner Medical Center Baton Rouge

TecuroLogic, LLC
PO Box 86536
Baton Rouge, LA 70879 USA
Tel: 225-214-6421
steve.spedale@tecurologic.com



Jason M. Fox, BS, MS
Chief Technology Officer
TecuroLogic, LLC
PO Box 86536
Baton Rouge, LA 70879 USA
jason.fox@tecurologic.com

E-mail comments to:
NT-3-17-pedinotes@neonate.biz

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Where to Start? Your Social Media Starter Kit - Social and Mobile Media for the Neonatologist

By Clara Song, MD

What do you find when you Google yourself? As a physician, that might seem like a strange question. Who has the time to tweet or post on Instagram -- not to mention privacy and HIPAA concerns? While the fear of social media for physicians may be a logical one, it's no longer a sensible one. As patients and the world at large continue to adopt online communication at an increasing rate, physicians cannot afford to remain on the periphery. Taking control of your online presence is easier than ever with the current social platforms. With a few tips, social media can easily work for you.

Here's How You Can Get Started

Choosing a social media platform is the first step. For many, this may be the most daunting part. To decide which options

make the most sense for you, consider your goals. Do you want to connect with other physicians? Share your clinical findings with a larger audience? Find a new job? Here's an overview of the most popular social media platforms for healthcare professionals and their use cases.

Doximity (www.Doximity.com)- the largest professional network for physicians and advanced practice clinicians. Over 60% of US doctors are members. Use Doximity to showcase your CV online, network with colleagues, read the latest clinical news & earn CME, search for jobs and get free workflow tools.

Twitter (www.Twitter.com) - a communication platform to share quick bites of information. Maximum correspondence length per post to tweet is 140 characters. Use Twitter to follow influential physicians in your specialty,

share news, connect at meetings and live-report from conferences.

LinkedIn (www.Linkedin.com) - an online networking platform for professionals across all industries, and an option for clinicians pursuing business endeavors and looking to connect with other non-clinicians.

In addition to choosing a social media platform, creating a personal website is another way to take control of your online presence and reputation. Patients are increasingly looking to the web to seek out information and evaluate physicians. Colleagues and other professionals are endlessly searching for networking opportunities. Making a website is an effective way to ensure your first impression is a professional one.

Maintaining a website does not need to be daunting or time-consuming. Doximity has a free tool that builds a professional website for busy physicians. It takes a minute to set up and a few more to edit. It will help you appear in the top of Google search results. It also links to your Doximity profile, so you don't have to worry about updating it yourself. Visit doximity.com/clinicians/quicksites to see how it works.

As physicians, social media may seem like one more thing to add to your to do list. While you can choose not to participate, staying out of the online conversation completely may have lasting consequences. We've all experienced the dreaded negative

	Doximity	Twitter	LinkedIn
Use Case	clinical CV, secure messaging, rolodex	public, 140-char snippets and links	business resume
Who Uses It	60+% of all U.S. physicians	300 million people	business professionals (45k doctors)
Physician Connections	clinical, professional, practicing physicians	social, public, conference hashtags	physicians in the business world
Verified Accounts	yes	for celebrities	no
HIPAA-Secure	yes	no	no

Figure 1.

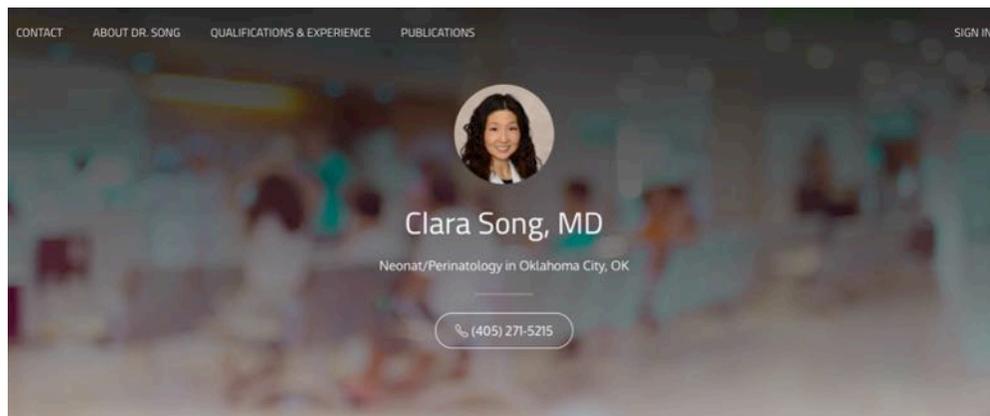


Figure 2..

“As patients and the world at large continue to adopt online communication at an increasing rate, physicians cannot afford to remain on the periphery. Taking control of your online presence is easier than ever with the current social platforms. With a few tips, social media can easily work for you.”

“As physicians, social media may seem like one more thing to add to your to do list. While you can choose not to participate, staying out of the online conversation completely may have lasting consequences. We’ve all experienced the dreaded negative online patient review, or the families who diagnose before the discussion even starts. Deciding what you want to get out of social media and how to take it into your own hands will help you stay in the driver’s seat of your online reputation.”

online patient review, or the families who diagnose before the discussion even starts. Deciding what you want to get out of social media and how to take it into your own hands will help you stay in the driver’s seat of your online reputation.

Curious how other physicians are using social media? Take a look at some of the more active social media channels of those online “tweetiatricans.”

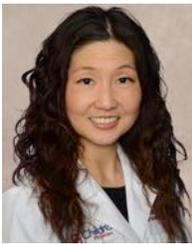
- Clara Song, Children’s Hospital at OU Medical Center [@songMD](#)
- John Zupancic, Harvard Medical School [@JohnZupancic](#)
- Tanya Remer Altmann, Community Pediatric Medical Group [@DrTanyaAltmann](#)
- Wendy Sue Swanson, Seattle Children’s Hospital [@SeattleMamaDoc](#)
- Bryan Vartabedian, Texas Children’s Hospital [@Doctor_V](#)

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NT

“Social & Mobile Media for the Neonatologist” by Dr. Song, is a periodic column in Neonatology Today. Dr. Song created and moderates the social media outlets for the American Academy of Pediatrics, Section on Neonatal-Perinatal Pediatrics, as well as the NICU at the Children’s Hospital at OU Medical Center. She holds workshops and speaks regionally and nationally on the topic of social communication for the healthcare professional, including: the AAP Perinatal Section Spring meeting, yearly, and the 2011 NEO: The Conference for Neonatology.



*Clara H. Song, MD
Assistant Professor of Pediatrics,
Section of Neonatal-Perinatal Medicine
University of Oklahoma Health Sciences
Center at OU Medical Center
Director of Education
Neonatal-Perinatal Medicine
Director of Mother-Baby Unit and Baby
Care Area
1200 Evert Dr., 7th Floor North
Pavilion, ETNP 7504
Oklahoma City, OK 73104 USA

clara-song@ouhsc.edu*

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Mar. 31 - Apr. 2, 2017; Scottsdale, AZ USA
<https://shop.aap.org/2017-workshop-on-perinatal-practice-strategies/>

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Apr. 19-27, 2017; Waikiki Beach, HI USA
www.academyonline.org

1st World Congress on Maternal Fetal Neonatal Medicine
Apr. 23 - 26, 2017; London, UK
www.worldmfnm.eu

15th Annual AirBorne Neonatal and Pediatric Transport Conference
May 10-12, 2017; Austin, TX USA
<http://int-bio.com/events-news/airborne-conference/>

The 28th Annual Meeting of the European Society of Paediatric and Neonatal Intensive Care (ESPNIC 2017)
Jun. 6-9, 2017; Lisbon, Portugal
<http://espnice2017.kenes.com>

The 3rd International Neonatology Association Conference
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Medical News, Products & Information

Compiled and Reviewed by Tony Carlson, Senior Editor

UCSF Discovery May Lead to New Treatments to Protect Fetus From Deadly Effects of Food Poisoning - Study Adds to Evidence Listeriosis is Unrelated to Lowered Immunity in Pregnancy

A newly identified bacterial protein that is shown to jump-start infection may be the culprit in a foodborne disease that strikes pregnant women in disproportionately high numbers, leading to miscarriage and pre-term birth in most cases. This finding, by scientists at UCSF Benioff Children's Hospital San Francisco, runs counter to conventional wisdom that attributes susceptibility to the disease in pregnant women to their compromised immunity.

Listeriosis is caused by *Listeria* bacteria, which are ubiquitous in the environment and have been identified in contaminated cantaloupes and ice cream in recent outbreaks. Listeriosis is 20 times more common in pregnant women than in non-pregnant adults and occurs more frequently in those with lowered immunity, such as cancer and transplant patients, newborns and the elderly.

Pregnant women with listeriosis typically experience mild flu-like symptoms such as fever, fatigue and muscle aches. But infections can lead to miscarriage, stillbirth, premature delivery or life-threatening infections in newborns.

Earlier work unraveled mystery of placenta

In the study, which is available in the current online issue of *Infection and Immunity* and scheduled to be printed in June 2017, researchers headed by senior author Anna Bakardjiev, MD, looked at pregnant guinea pigs, because the placentas and responses to *Listeria* closely resemble their human counterparts.

Previous research by Bakardjiev focused on unraveling a mystery: how bacteria invade the placenta, an organ that connects the uterus to the fetus and is normally responsible for providing a protective barrier against infectious agents. She found that a single bacterium was responsible for the infection that grew to very high numbers in the placenta, indicating another factor played a role in listeriosis.

"Given the unique immunological environment of the placenta, we hypothesized that virulence factors would be required for infection of this tissue that are not necessary for infection of other organs," said Bakardjiev, Associate Professor at UCSF Benioff Children's Hospital San Francisco in the Division of Infectious Diseases and the UCSF Microbial Pathogenesis and Host Defense Program.

In this current study, Bakardjiev and colleagues performed a genomic screen in pregnant guinea pigs that led to the identification of 201 *Listeria* genes implicated in infection of the placenta. Using genetic tools, they identified a protein secreted by *Listeria* that promotes placental infection, while having only a minor role in the infection of other organs.

'Virulence factors' required for growth and survival

In research with guinea pigs and mice, the scientists discovered that the protein, which they named InIP, increased the amount of bacteria in the placenta by 1,000-fold, while having minimal impact on other maternal organs.

"The findings challenge the dogma that pregnant women are susceptible to listeriosis because of immune compromise," Bakardjiev said. "Instead, placental pathogens need specific virulence factors that allow them to grow and survive in this niche."

"InIP presents a novel tool that we can use to better understand the course of placental infections, which is necessary for the development of new strategies to prevent and treat listeriosis and other infection-related pregnancy complications."

Listeria is the third leading cause of death from food poisoning in the United States, according to the U.S. Centers for Disease Control and Prevention. An estimated 1,600 people get sick from *Listeria* each year and one-third of these cases are associated with pregnancy. Approximately 260 people die from listeriosis.

The study is supported by grants from the National Institutes of Health and the Burroughs Wellcome Fund.

Joint first authors are: Cristina Faralla, PhD, of UCSF Benioff Children's Hospital San Francisco and the UCSF Program in Microbial Pathogenesis and Host Defense; and Gabrielle Rizzuto, MD, PhD, also of the UCSF Program in Microbial Pathogenesis and Host Defense and of the UCSF Department of Pathology. Co-authors are David E. Lowe, PhD; Byoungkwan Kim, PhD; Cara Cooke, PhD; and Lawrence Shiow, MD, PhD, all of UCSF Benioff Children's Hospital San Francisco.

for more information about UC San Francisco (UCSF), visit www.ucsf.edu/news.

UWM Physicists to Use Their Unique Tool to Improve Neonatal Health

Newswise — Exactly when an expectant mother conceived helps physicians prepare for life-threatening complications that come with early- and late-term childbirth. But the parents' estimates can be off by weeks.

Physicists at the University of Wisconsin-Milwaukee are using an algorithm to estimate the time of conception with much greater accuracy. In some circumstances, the algorithm can reduce timing uncertainty by a factor of 300. If that holds true in this application, it could shrink the estimate to a range of days or hours. The project is funded by the Bill & Melinda Gates Foundation.

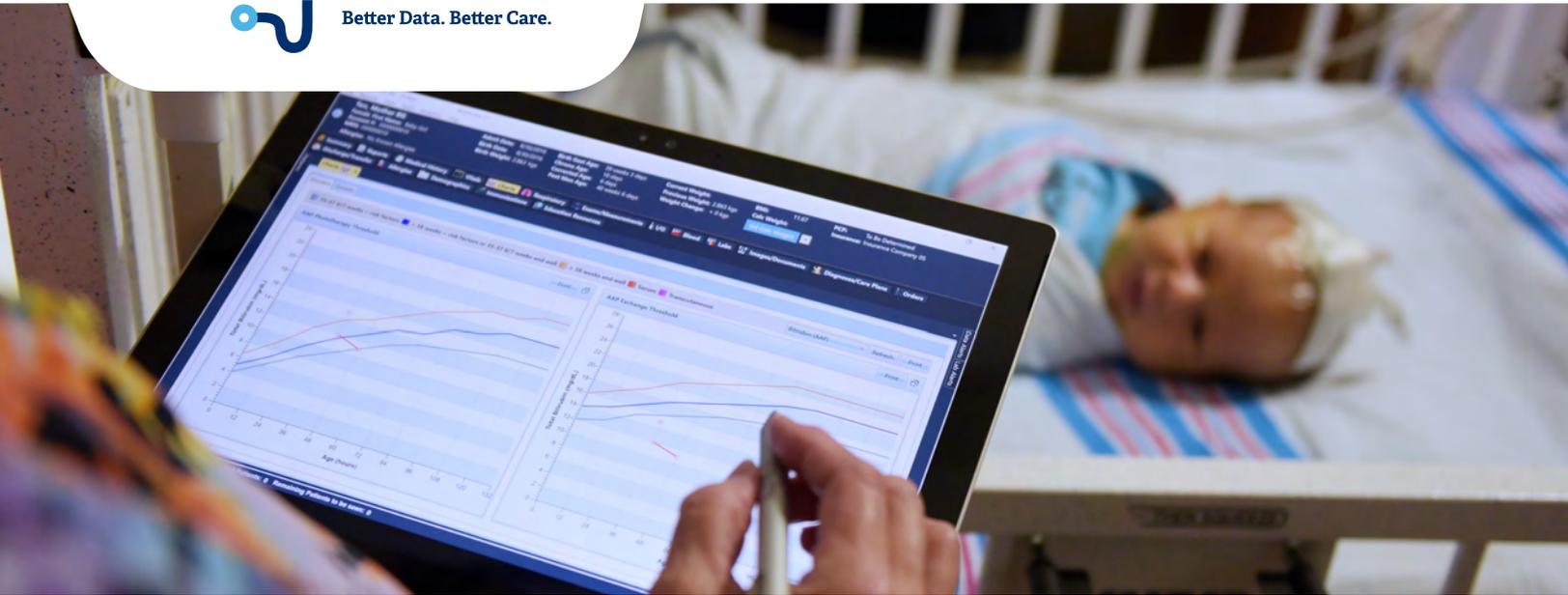
This mathematical approach was devised by Abbas Ourmazd and Russell Fung and published in 2016 in the journal *Nature*.

The computer algorithm works by extracting a weak "arrow of time" from noisy data with highly inaccurate time stamps. Think of it as restoring the initial sequence of a deck of cards after it has been heavily shuffled.

The algorithm was originally devised to make movies of ultrafast chemical bond-breaking in molecules, said Ourmazd, but could have many applications.

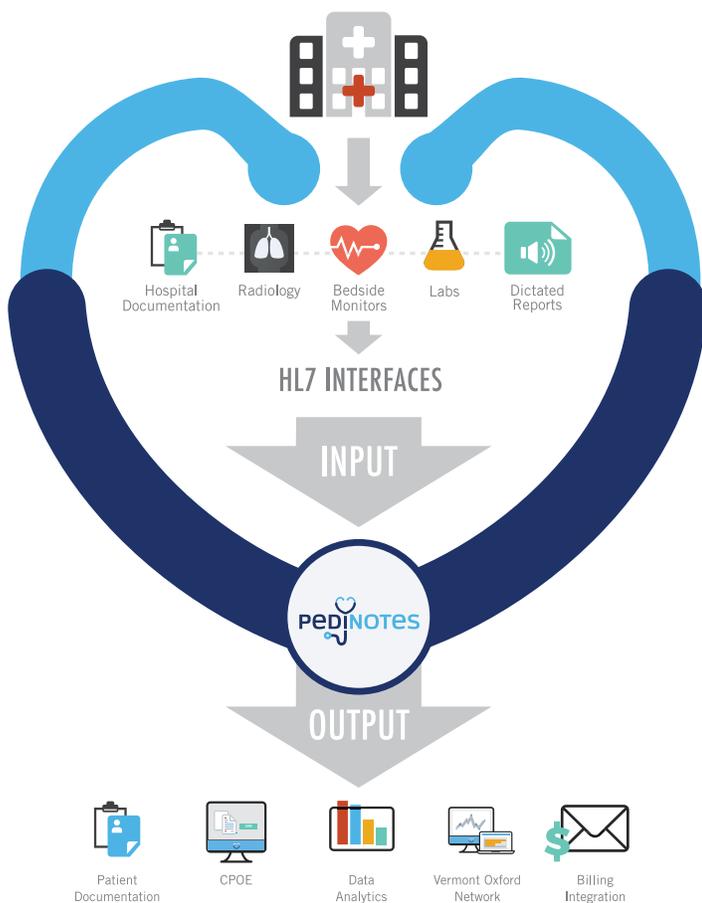
The data for application to neonatal health will come from the foundation's collection of global statistics on the health of mothers and babies during, and for many years after, pregnancy.

"It is a privilege to use the algorithm we originally developed for



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fundamental science to help improve people's health everywhere, particularly in developing nations," said Ourmazd, a UWM Distinguished Professor of Physics.

Understanding the Causes of Neurological Abnormalities that Result from Premature Birth

In the February issue of the *American Journal of Pathology*, new research from the University of Chicago shows motor abnormalities frequently associated with low birth weight-babies could originate due to peripheral nerve defects.

"There has been a lot of focus on the central nervous system and we know that these infants do not myelinate the brain well, meaning they don't produce the multi-layer membrane that surrounds nerve cells as robustly as normal birth-weight babies," explained study author Brian Popko, PhD, and Jack Miller Professor of Neurological Disorders in the Department of Neurology and Director of the University of Chicago Center for Peripheral Neuropathy.

The study suggests that preterm infants may experience delayed development and myelination of the peripheral nervous system that could contribute to motor and neurological deficits experienced in adulthood, according to the lead author Ben Clayton, PhD, a former graduate student in Popko's lab.

"It is thought the reason that there are these abnormalities within the central nervous system is secondary to the fact that they are not as well oxygenated as a normal birth weight baby because their lungs have not developed to the extent that normal birth weight babies do," said Popko.

Due to advances in medicine and treatment many of these infants now survive, but with new complications stemming from developmental abnormalities. Researchers are now trying to understand the link between hypoxia (low oxygen), myelination, and the observed nervous system defects.

"This study suggests that the motor abnormalities low birth weight babies develop could originate due to peripheral nerve defects, as well as central nervous system defects," said Popko. "We need to take this into consideration when we are thinking about therapeutic approaches."

Preterm Infants Fare Well in Early Language Development: Study Advances Understanding of Earliest Link between Language and Cognition in Vulnerable Population

Newswise — Preterm babies perform as well as their full-term counterparts in a developmental task linking language and cognition, a new study from Northwestern University has found.

The study, the first of its kind with preterm infants, tests the relative contributions of infants' experience and maturational status. Northwestern researchers compared healthy preterm and full-term infants at the same maturational age, or age since conception. The results show a robust early link between language and cognition in preterm infants, revealing that this vulnerable population begins life



DIRECTOR OF CLINICAL RESEARCH NEONATAL INTENSIVE CARE UNIT YALE UNIVERSITY SCHOOL OF MEDICINE

The Department of Pediatrics at Yale School of Medicine is seeking a neonatologist to serve as Director of Clinical Research for a large academic level 4 NICU. This position will include oversight of all research protocols in the NICU, including supervision of research nurses, and mentoring of neonatology fellows and junior faculty. Experience in the NICHD neonatal research network is particularly desirable. This is an outstanding opportunity to join the leadership team of a major academic neonatology division.

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3 BIG THINGS



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LOCATION: Believe it or not, location drives most physician job opportunity decisions, but people often end up in the wrong places for the wrong reasons – the placement doesn't last and they must start their search all over again after a year or so. Conversely, often the best locations are places that people rarely think of, but which offer the lifestyle and family considerations that are at the core of what people are truly looking for.

WORK LIFE: Work life is arguably the most complex consideration to evaluate. Do you like the people you are (or will be) working with? Do they inspire you to do your best? Does the organization appreciate you and your contribution? Are you happy there? Do you look forward to starting work each day?

MONEY: Contrary to popular belief, money should never be the primary consideration. Money is always important and if it isn't sufficient it will kill the deal – but money is too often used by employers to mask weakness in other areas of consideration. That might be alright if it offsets location, for example - but money alone is a poor trade-off for the ongoing misery of a bad work life.

Of course, this is just a summary of these three considerations – there is more to it as you drill down on each of these areas and evaluate opportunities. If you would like some personalized help finding a great physician practice, please contact me at mike@hathawayhealthcare.com or 954-603-1192.

I look forward to helping you!

Sincerely,

Mike Hathaway

Hathaway Healthcare Executives

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with a strong foundation for linking language and meaning.

“This study permits us to tease apart -- for the first time ever -- the roles of infants' early experience and maturational status in establishing this critical language-cognition link,” said senior author Sandra Waxman, the Louis W. Menk Chair in Psychology in the Weinberg College of Arts and Sciences at Northwestern and faculty fellow in the University's Institute for Policy Research.

To illustrate, consider two infants conceived on the same date. If one happens to be born a month early, then although the infants will always share the same maturational age (age since conception), the preterm infant will have an opportunity to acquire an extra month of postnatal experience listening to language. But does this additional month of experience “boost” the preterm infants?

To address this, the Northwestern researchers compared preterm and full-term infants to identify the developmental timing of their link between language and object categorization, a link previously only documented in full-term infant.

In previous work with full-term infants, a Northwestern team had shown that by three months, infants successfully form object categories while listening to language and that this language-cognition link persists throughout the first year of life.

In addition, between three and four months, full-term infants exhibit an intriguing developmental shift: At three months, they look longer at the familiar object (familiarity preference), but from four months on, they look longer at the novel object (novelty preference).

The new study was designed to capitalize on this tightly timed “familiarity-to-novelty” shift in full-term infants. The new evidence revealed: first, the same shift in healthy preterm infants and second, that this developmental shift unfolds on the same maturational timetable as in their full-term counterparts. This provides strong evidence about infants' earliest links between language and cognition and how they unfold.



**Nicklaus
Children's
Hospital**

MIAMI CHILDREN'S HEALTH SYSTEM 



**PEDIATRIC
SPECIALISTS
OF AMERICA**
Miami Children's Health System

Neonatologist and Neonatal ARNP Opportunities in Miami, Florida

Nicklaus Children's Hospital (formerly Miami Children's Hospital), a 289-bed freestanding children's hospital and Level III trauma center, and Pediatric Specialists of America (PSA), the physician-led multispecialty group practice of Miami Children's Health System, have two exceptional opportunities for a board-certified or board-eligible (BC/BE) fellowship-trained neonatologist, and a neonatal ARNP with at least three years of experience.

Both positions will be part of a comprehensive high-risk fetal and newborn medicine program to care for healthy mothers who are expecting a baby with complex medical issues. The labor and delivery unit, consisting of 16 private rooms, is located at The Miami Medical Center (TMMC). Opened as a joint venture between Miami Children's Health System and other collaborators, TMMC is a hospital with 67 luxury suites located near West Miami that offers world-class healthcare services, personalized hospitality and premium amenities. The unit is currently supported by three physicians and five ARNPs, with a projected volume of more than 500 deliveries for 2017.

The BC/BE neonatologist will be responsible for attending deliveries, resuscitating and stabilizing newborns in the delivery room, as well as provide leadership, oversight and supervision in the Level I nursery. The neonatologist would also be operationally involved in the 10-bed, high-risk delivery unit at Nicklaus Children's Hospital. The neonatal ARNP candidate should possess at least three years of experience and be proficient in newborn resuscitation, including neonatal intubation, umbilical line placement and peripheral cannulation, lumbar punctures and circumcision. Both roles are based in Miami and offer salaries that are competitive and commensurate with experience.

Nicklaus Children's neonatology program is consecutively ranked among the best in the nation by U.S. News & World Report. The 40-bed Level III and Level II neonatal intensive care unit (NICU) was the first of its kind in South Florida and receives referrals of the most critically ill neonates from hospitals throughout Florida, Latin America and the Caribbean.

Founded in 1950, the rebranded Nicklaus Children's Hospital is renowned for excellence in all aspects of pediatric medicine and has numerous subspecialty programs that are routinely ranked among the best in the nation. It is also home to the largest pediatric teaching program in the southeastern U.S. Many of our physicians have trained or worked at other leading medical institutions. Join a phenomenal team that brings lifelong health and hope to children and their families through innovative and compassionate care.

Nicklaus Children's Hospital is located in Miami, Florida, and offers all of the advantages of a tropical, diverse, metropolitan community. Enjoy abundant sunshine and warm weather year-round with easy access to beaches, golf courses, two international airports and sporting events such as the Miami Dolphins, Heat, Marlins and Panthers.

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Pediatric evidence reveals that although healthy preterm infants reach some developmental milestones on the same maturational timetable as their full-term peers, they nevertheless tend to encounter obstacles in language, cognitive and attentional processing capacities. This is evident in their use of early intervention services from infancy through school age.

“This study provides assurance that whatever obstacles preterm infants face in later language and cognitive development, these are unlikely to reflect difficulties in establishing the foundational link between language and core cognitive processes,” said Danielle Perszyk, the study’s first author and a PhD candidate in Psychology at Northwestern.

“Maturation constrains the effect of exposure in linking language and thought: Evidence from healthy preterm infants” was published online Dec. 29, 2016 in *Developmental Science*.

In addition to Waxman and Perszyk, Northwestern co-authors: include Brock Ferguson.

Newborn Screening Practices, Issue of Genetic Ownership Examined

Newswise — Before Samantha Zent’s parents brought home their newborn daughter from the hospital 22 years ago, Zent left behind a blood sample.

“I was born in Nappanee, IN, and my blood sample is currently in the Indiana State Department of Health possibly being used for research because state policy says it will be held there until I turn 23,” Zent said.

The Indiana State University senior Biology major is one of the thousands of babies born each day who leave the hospital having been tested for a variety of inheritable and fatal health conditions through a practice known as newborn screening.

While newborn screening is one of the national public health services that has transformed preventive healthcare, there are certain ethical and legal concerns about what happens to the babies’ genetic information beyond the tests.

As a part of the Summer Undergraduate Research Experience program, Zent explored each state’s policy and procedure as it pertains to newborn screening practices.

“I found that up until 2014 when President Obama passed the Newborn Screening Saves Lives Reauthorization Act, there was no federal mandate that required hospitals and research entities get parental consent to use the child’s sample in research,” Zent said.

In recent years, there have been newborn screening lawsuits filed against many states, including one against the Indiana State Department of Health, for the improper storage and use of blood samples obtained from newborn screening.

“I think this really became a national conversation after the book ‘The Immortal Life of Henrietta Lacks’ by Rebecca Skloot came out,” said Nathan Myers, a faculty sponsor for the SURE program.



ACADEMIC NEONATOLOGIST PHYSICIAN-SCIENTIST YALE UNIVERSITY SCHOOL OF MEDICINE

The Department of Pediatrics at Yale School of Medicine is seeking an early career neonatologist, interested in pursuing a career combining laboratory-based research with clinical responsibilities in the Level IV NICU at Yale-New Haven Children’s Hospital, in New Haven, CT. The ideal candidate will be on a trajectory toward becoming an independent investigator, or already functioning on that level. Significant protected time and initial research funding are available. Graduating fellows with significant research experience and potential are encouraged to apply.

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Applicants should be Board Certified or Board Eligible in Neonatal-Perinatal Medicine, and qualified for an appointment to the faculty at Yale School of Medicine.

Please address inquiries, along with curriculum vitae and a list of 3 references, to:

Mark Mercurio, M.D., Chief,
Neonatal-Perinatal Medicine
Department of Pediatrics
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New Haven, CT 06520
email: mark.mercurio@yale.edu.

Yale University is an equal opportunity, affirmative action employer. Women, minorities, persons with disabilities and protected veterans are encouraged to apply. This position is available immediately.



The National Perinatal Association (NPA) is an interdisciplinary organization that gives voice to the needs of parents, babies and families and all those interested in their health and wellbeing. Within NPA, parents and professionals work together to create positive change in perinatal care through education, parent programs, professional guidelines and events.

www.nationalperinatal.org

In 1951, Henrietta Lacks, a poor African-American woman, was diagnosed with cervical cancer at Johns Hopkins Hospital. Her cells were taken without her knowledge and used to advance scientific research. Now known as HeLa cells, they helped to develop medical innovations such as the polio vaccine and countless others.

"There is a certain amount of controversy surrounding this issue of who actually owns your genetic information and to what extent does the individual actually have ownership," Myers said. "Samantha looked at her research from high-risk to low-risk states in terms of a parent's perspective. Is there a lot of information provided on newborn screening and a low level of storage time for the samples? The states that store samples forever and do not provide any information about newborn screening or research are the ones that might have a higher probability of using that genetic information in a negative way."

Zent concluded there is a general lack of knowledge about newborn screening and research for parents and healthcare providers. In her research, which is ongoing, she suggests that genetic counselors may be able to bridge the gap between researchers, physicians and families.

"The personal side of me wishes genetic counselors could meet with all of those women to help them understand what their babies are even being tested for, because I don't think there is very much education," said Megan Tucker, director of the master's of genetic counseling program. "At the same time, when there are less than 50 of us in the entire state, I don't think there is the physical man power to truly touch the thousands of women that have babies every year."

Genetic counseling began as a profession in the 1970s to interpret and explain genetic information and disorders in order to educate individuals, especially parents and families.

"It is very much a growing field that leads into all kinds of different specialties, not just prenatal, but into adult disorders and neurology and cardiology," Tucker said. "So it's growing in a lot of directions, which that in itself makes it hard for us to keep up with all of those things with the few of us that exist."

Indiana State's Master's of Genetic Counseling is the 33rd accredited program in the U.S. and Canada, and aims to help fill the profession's needs while providing students with an interdisciplinary education.

"In theory, a graduate student from our program, or any genetic counseling program, should be able to walk out and know all of the areas that genetic counselors work in, such as prenatal, oncology clinics, pediatrics and others," Tucker said.

The two-year program, which accepted its first class in August, offers a unique opportunity for students to gain experiential learning in the new Genetic Counseling Clinic in Wabash Valley.

"Indiana State and Union Hospital have partnered to open the first genetic counseling clinic in which we are now serving patients with diagnoses of cancer or psychiatric disorders, such as schizophrenia or bipolar disorder," Tucker said. "Through the Center for Genomic Advocacy, the genetic counseling program and the clinic, we begin to truly reach out to individuals outside of the university to the Terre Haute community."

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11502 Elk Horn Dr., Ste. 201
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www.NeonatologyToday.net

Editorial offices:
16 Cove Rd, Ste 200
Westerly, RI 02891 USA

Publishing Management:

- Tony Carlson, Founder, President & Senior Editor - TCarlsonmd@gmail.com
- Richard Koulbanis, Group Publisher & Editor-in-Chief - RichardK@Neonate.biz
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