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## A Rare Fetal Diagnosis: Aortico-Left Ventricular Tunnel

By Brie Ann Muller, MD; Karim A. Diab, MD

### Introduction

Aortico-left Ventricular Tunnel (ALVT) is a rare congenital anomaly, occurring in less than 0.1-0.5% of patients with Congenital Heart Disease, and is usually diagnosed in the postnatal period.<sup>1,2</sup> It is comprised of a tunnel-like communication from the ascending aorta to the left ventricle. There have been reported cases of communication with the right ventricle, but these remain much less frequent. Associated coronary anomalies have occasionally been reported as well. Only a few cases of prenatal diagnosis have been previously reported, as this can be a challenging lesion to diagnose in the fetus. However, advancements in fetal imaging are likely to lead to more antenatal diagnosis of ALVT. Of the reported cases with a prenatal diagnosis, only a few have had a favorable outcome after surgery. We report a case of ALVT, that was diagnosed at 26 weeks of gestation and successfully managed surgically in the newborn period.

### Case Presentation

A 30 year-old G3P2 female was referred to our center at 26 weeks of gestation for a fetal cardiac evaluation due to suspicion of a cardiac anomaly on routine screening ultrasound. A fetal echocardiogram revealed ALVT resulting in severe regurgitation and dilation of the left ventricle with increased wall thickness and mildly decreased systolic function (Figure 1). Additional fetal

*“However, advancements in fetal imaging are likely to lead to more antenatal diagnosis of ALVT. Of the reported cases with a prenatal diagnosis, only a few have had a favorable outcome after surgery.”*

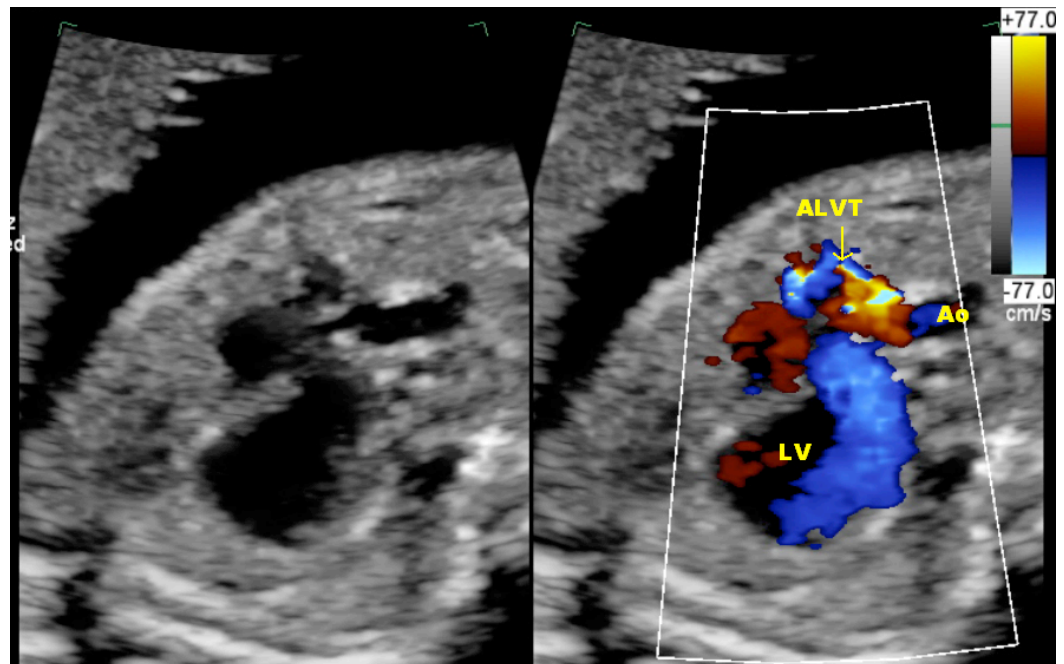


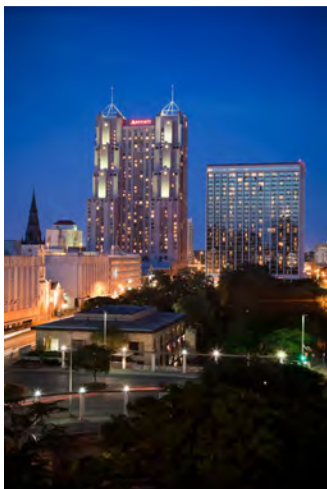
Figure 1. Fetal echocardiogram with 2D and color Doppler showing the aortico-left ventricular tunnel from the aortic root, extending anteriorly to the aortic valve and inserting into the LV; Ao = aorta; LV = left ventricle; RA = right atrium; ALVT = Aortico-left ventricular tunnel.

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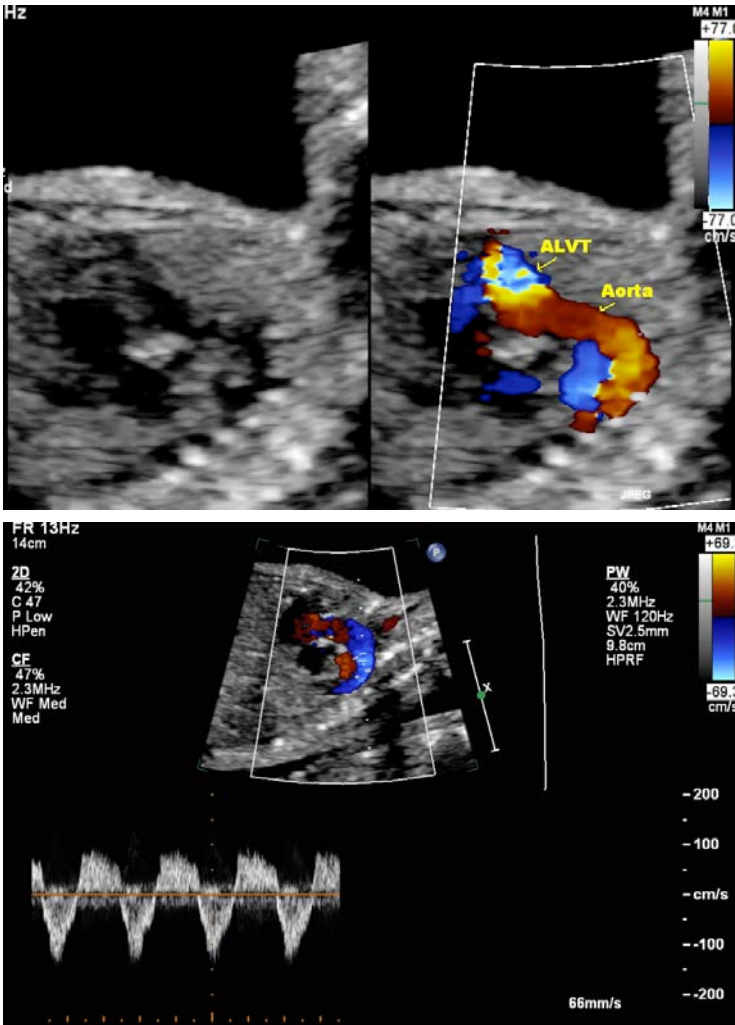


Figure 2. (A-Top) Fetal echocardiogram demonstrates dilated ascending aorta with retrograde flow into the ascending aorta on color Doppler, and (B-Bottom) by pulse Wave Doppler. ALVT = Aortico-left ventricular tunnel.

echocardiogram findings included thickened and dysplastic aortic valve leaflets with mild aortic valve regurgitation and dilated ascending aorta with significant flow reversal across the aortic arch (Figure 2). There was cardiomegaly with a CT ratio of 0.6. The patient was monitored with serial echocardiograms with normalization of ventricular function and no evidence of hydrops, and was delivered at 38 weeks by normal vaginal delivery.

Postnatal echocardiogram confirmed the prenatal diagnosis of ALVT (Figure 3) with the additional suspicion of a coronary artery anomaly, as there was no flow visualized in the right coronary artery (RCA). Cardiac computed tomography angiography confirmed the findings with a

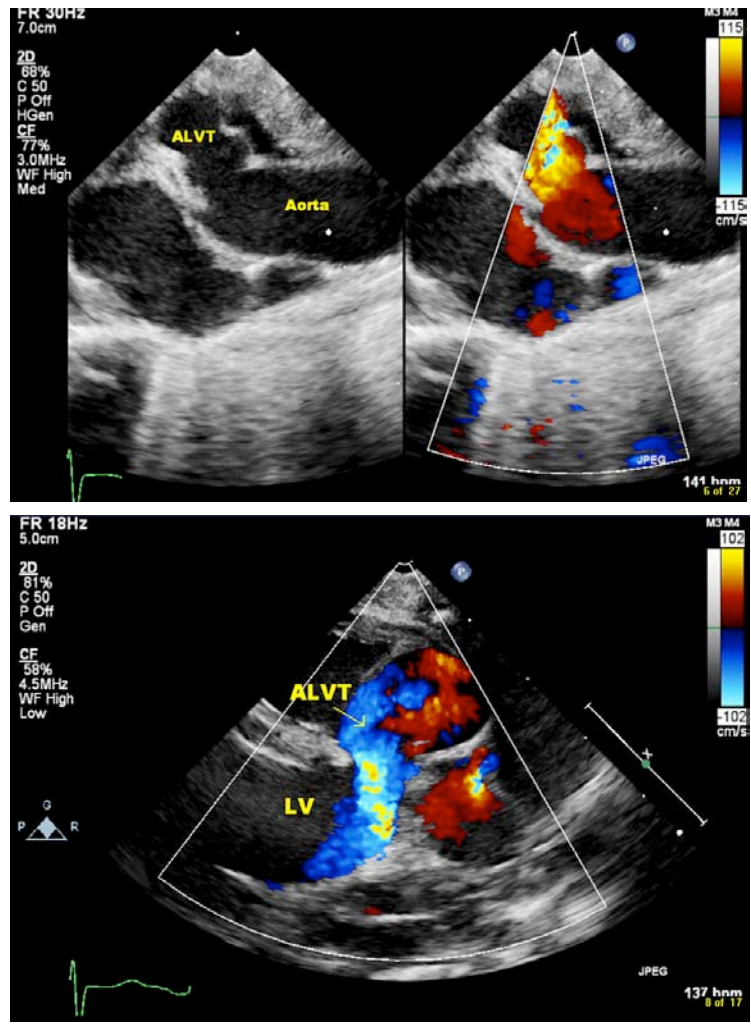


Figure 3. (A-Top) Postnatal transthoracic echocardiogram showing the parasternal long-axis view of the aorto-left ventricular tunnel extending from the aortic root, and (B-Bottom) inserting into the LV outflow tract.

tunnel seen from the aortic root, extending anteriorly to the aortic valve and inserting into the LV outflow tract. The left coronary artery origin was normal and the right coronary artery appeared to originate from the right aortic root adjacent and posterior to the insertion of the tunnel. The infant underwent surgical patch repair on Day of Life 3 with patch placement at the aortic end of the tunnel. The right coronary ostium, and RCA were not visualized intra-operatively, but this did not impact the repair. Post-operative course was complicated by a large pericardial effusion which was drained, and the patient was discharged home at 14 Days of Life. On serial follow-up visits, the patient was growing well, and an echocardiogram revealed initial mild residual patch leak at the aortic end of



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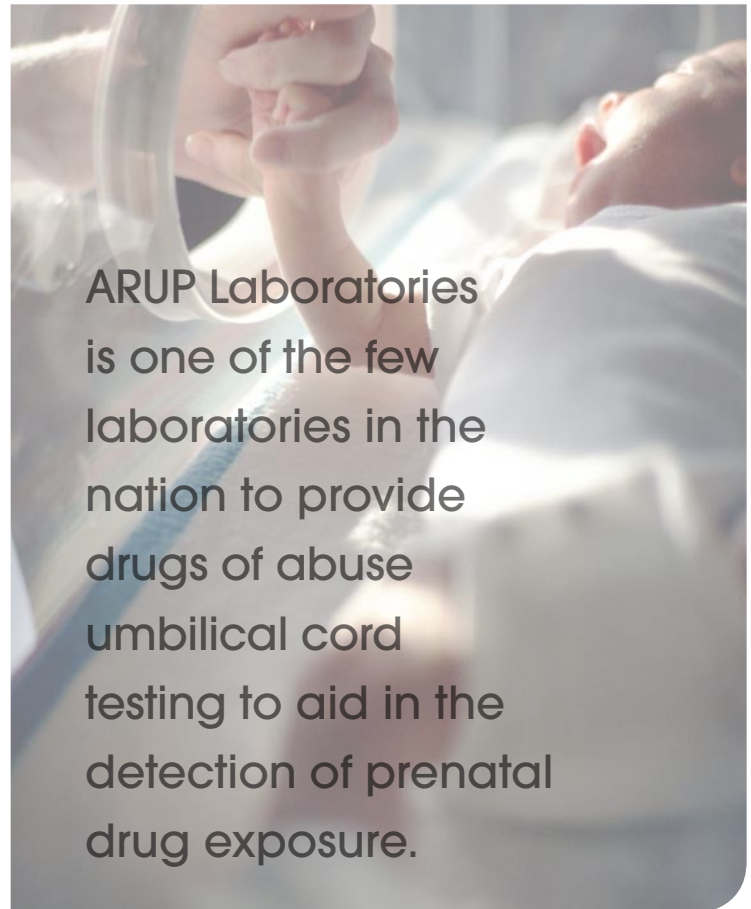
the tunnel that subsequently resolved at 5 months of age, and normal left ventricular systolic function.

## Discussion

Since Levy et al. first described ALVT in 1963<sup>3</sup>, approximately 130 cases have been reported, of those, fetal diagnoses occurred in less than 20%. Fetal diagnosis of ALVT was first reported in 1995<sup>4</sup>, and appears to be on the rise in recent years, likely due to improvements in routine ultrasound screening. Historically, survival for patients with fetal diagnosis of ALVT has been lower than for those diagnosed in infancy or later in life. This was likely because those diagnosed in utero had more severe aortic regurgitation, dilated left ventricles with poor function and hydrops, which prompted their fetal diagnosis. Whether or not survival is improving for those patients with fetal diagnosis of ALVT remains uncertain. In 1996, Sousa-Uva described 3 antenatal cases of ALVT, all of which died (1 was due to pregnancy termination).<sup>5</sup> In recent years, multiple cases have been reported with more favorable outcomes.<sup>6,7</sup> A more hopeful report by Singh et al. described 4 antenatal cases, 3 of which survived.<sup>8</sup>

Signs of ALVT by routine obstetric ultrasound include: dilated and/or dysfunctional left ventricle, enlarged cardiothoracic ratio and Doppler color flow mapping suggesting a regurgitant flow into the left ventricle. Other signs more likely detected by fetal echocardiography include: LV hypertrophy, reversal of flow in the ascending and descending aorta, dilated ascending aorta, increased pulsatility of the ascending and descending aorta in combination with no or minimal regurgitation through the aortic valve itself. The presence of a “cockade sign” by 2D and color Doppler demonstrating the tunnel as a double ring structure around the aortic valve annulus can help suggest the diagnosis as well.<sup>7</sup>

Although fetal echocardiography will likely distinguish ALVT from isolated aortic valve regurgitation, a few other diagnoses may remain on the differential list, mainly ruptured sinus of Valsalva and coronary artery-LV fistula, in addition to an associated VSD. By postnatal echocardiogram, the differential diagnosis can be narrowed even further when the coronary artery anatomy, ventricular septum and ascending aorta can be studied in detail. ALVT can be distinguished from ruptured sinus of Valsalva by the more anterior and superior origin of the tunnel and the absence of a dilated sinus of Valsalva. Normal right and left coronary artery anatomy will eliminate the possibility of a coronary artery-LV fistula, although one must take into account the possibility of coronary artery abnormalities in association with ALVT. Cases have been reported of single left coronary artery and anomalous origin of the right coronary artery from the ALVT.<sup>2</sup> Therefore, precise assessment of the coronary anatomy must be done in those with suspected ALVT and additional imaging modalities may be necessary in these patients, specifically cardiac



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catheterization with angiography, cardiac CT or MRI. Lastly, the absence of left-to-right shunt across the LV septum will exclude an associated VSD.

Further complicating the diagnosis, aortic valve pathology is often seen with ALVT. Bicuspid aortic valve with varying degrees of aortic stenosis have been reported.<sup>9</sup> In one extreme case, the tunnel was mistaken for the LVOT and aortic valve due to aortic atresia.<sup>10</sup> More severe forms of aortic stenosis will lead to LV hypertrophy, myocardial fibrosis and LV dysfunction. These are likely the patients with ALVT who present with fetal hydrops and in utero demise.

The patient with signs of ALVT on fetal echocardiogram should be followed frequently after diagnosis due to the possibility of progressive LV dilation and subsequent dysfunction with the ultimate scenario of fetal hydrops. After delivery, the diagnosis should be confirmed by transthoracic echocardiogram, and any further imaging necessary, as mentioned above. Once complete evaluation of the cardiac anatomy has been performed and ALVT confirmed, repair is usually prompt, pending any other comorbidities.

Treatment for this lesion is primarily surgical, with patch or suture closure at either or both ends of the tunnel. Transcatheter device closure has been described for the initial closure of the defect, as well as for residual defects after surgical patch closure.<sup>11,12</sup> Survival has improved to nearly 100% following surgical closure.<sup>13</sup> The risk factors for increased mortality appear to be: size of the tunnel and resulting amount of regurgitation, concomitant aortic valve abnormalities, coronary artery anomalies and resultant myocardial ischemia and ventricular dysfunction.

In conclusion, ALVT is a surgically treatable cardiac lesion with good long-term results. Patients diagnosed in utero tend to have greater risk for early mortality. Prenatal diagnosis of ALVT is possible, and can aid in decisions regarding postnatal care and timely surgical treatment.

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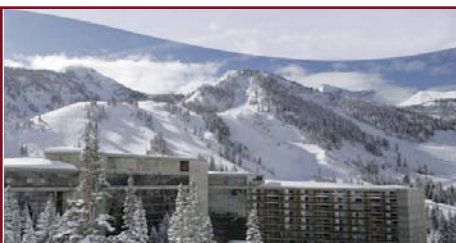
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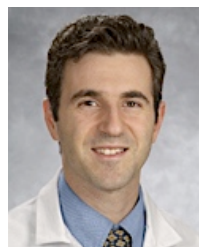


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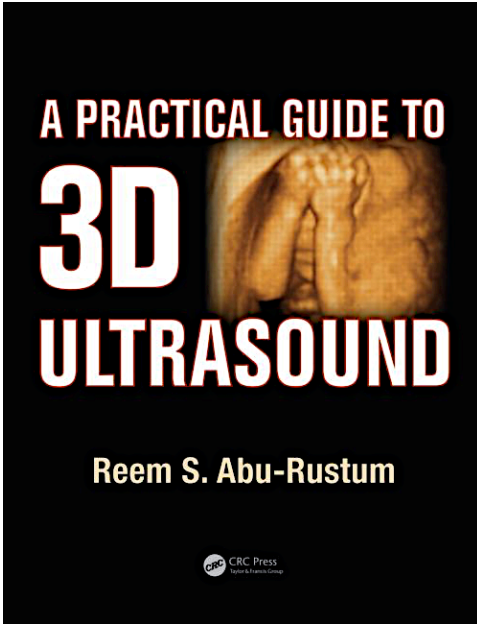






# Book Review: "A Practical Guide to 3D Ultrasound," by Reem S. Abu-Rustum

Reviewed by Mark S. Sklansky, MD



*A Practical Guide to 3D Ultrasound*  
by Reem S. Abu-Rustum, MD  
December 9, 2014 by CRC Press  
Reference - 173 Pages - 265 Color  
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Over the past 25 years, the field and practice of diagnostic obstetric/gynecologic ultrasound has advanced like never before. Much of this progress is due to the development of increasingly powerful computing systems and sophisticated transducer technology. Advances in these areas have resulted in vast improvements in

2D image quality, with exponentially superior depth and resolution capabilities.

At the same time, these dramatic technological advances have also led to the development of profound 3D/4D imaging capabilities. Since the early pioneering work of Dolores Pretorius and Thomas Nelson in the late 1980s and early 1990s, the field of 3D/4D obstetric/gynecologic ultrasound has grown from an intriguing novelty in scattered academic centers, to an important, commercially-viable clinical tool in practices around the world.

While many thousands of papers have been written on 3D/4D obstetric/gynecologic ultrasound, few resources exist for the practitioner interested in a general review of the technique, and in a practical explanation of its clinical application. Dr. Reem S. Abu-Rustum, an internationally recognized authority and wonderfully-gifted teacher in the field, has recently published an outstanding, clinically-oriented "how-to" textbook to fill this void. *A Practical Guide to 3D Ultrasound* will be of great interest to those practitioners interested in introducing or expanding the use of 3D/4D obstetric/gynecologic ultrasound in their practice or at their institution.

The textbook begins with easy-to-read background chapters on terminology, acquisition, evaluation and display of volume-data. Subsequent chapters discuss the application of specific techniques and software, such as STIC (spatiotemporal image correlation), VCAD (volume computer-aided diagnosis), and VOCAL (virtual organ computer-aided diagnosis), followed by multiple organ-specific chapters detailing the approach and rationale for application of 3D/4D ultrasound to various obstetric/gynecologic and (primarily) fetal areas (heart/spine/brain/face/GI/GU, among others). The text ends with an informative chapter on coding/billing

and the role of medical ultrasound practices in providing "keep-sake" fetal images to expectant patients and their families.

This well-written and clinically grounded textbook has innumerable strengths, foremost among them: Dr. Abu-Rustum's years of experience, attention to detail, and candid, practical approach. Beautiful and instructional color images compliment the text throughout the book, practically on every page. These images are priceless, and can be reviewed alone along with their legends. Specific descriptions of various published algorithms and techniques can help readers translate what can be found in academic journals to actual clinical practice. Among the greatest assets of the book are the precious "practical pearls" found at the conclusion of each chapter. These pearls alone are worth the price of the text.

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***"Dr. Reem S. Abu-Rustum, an internationally recognized authority and wonderfully gifted teacher in the field, has recently published an outstanding, clinically-oriented "how-to" textbook to fill this void. A Practical Guide to 3D Ultrasound will be of great interest to those practitioners interested in introducing or expanding the use of 3D/4D obstetric/gynecologic ultrasound in their practice or at their institution."***

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## A Practical Guide to 3D Ultrasound

by Reem S. Abu-Rustum, MD

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The textbook's primary weakness may represent the flip-side of one of its strengths. The inclusion of terminology, approaches and algorithms that are currently vendor-specific will be useful for many readers, but will not be available to all practitioners, and may soon be replaced with newer and more sophisticated algorithms and techniques. This weakness may be most evident in those portions of the text relating to fetal cardiac 3D/4D ultrasound; the clinical application of 3D/4D techniques to the

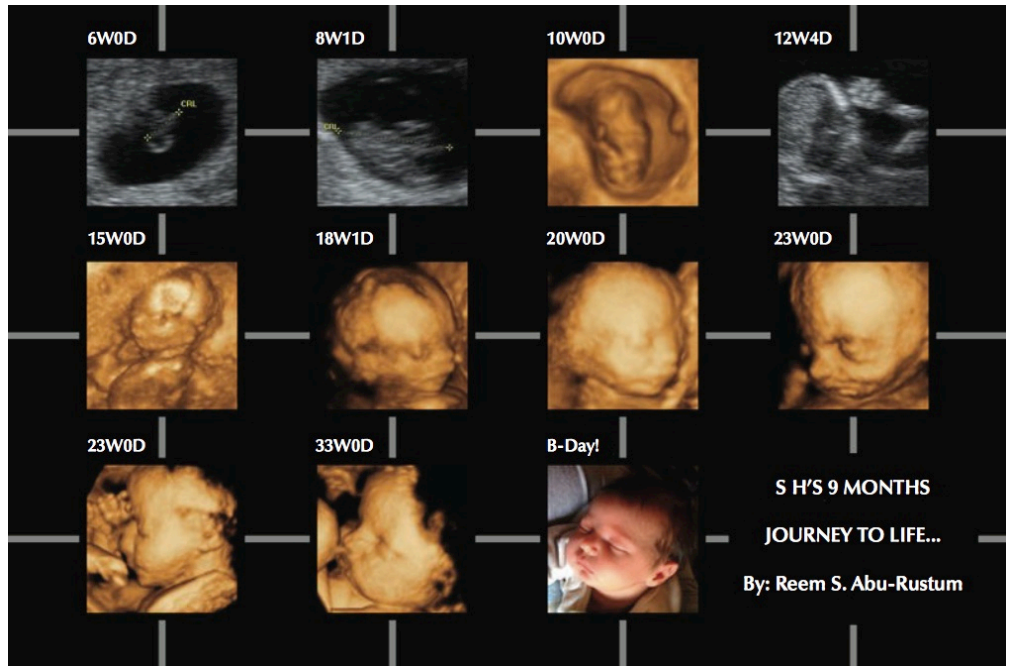


Image from the Preface. page xi. Reprinted with permission.

fetal heart remains limited primarily by image quality considerations, but also by somewhat cumbersome vendor-specific algorithms/techniques.

Dr. Abu-Rustum's textbook represents a landmark "user's manual" for the practitioner of 3D/4D obstetric/gynecologic ultrasound, and teaches many valuable lessons beyond specific techniques. Among these lessons, as stated in her "practical pearls" section, is that "the key to a good 3D image is a good 2D image." Dr. Abu-Rustum appropriately emphasizes this caveat throughout the text, as well as the potential for artifact found in all applications of 3D/4D ultrasound. She offers numerous tips/pearls on how to obtain high quality 2D (and thus 3D/4D) images, and how to minimize artifact, including narrowing the field of view and obtaining proper angles of acquisition. But, the book's focus remains squarely on the practice of 3D/4D obstetric ultrasound.

Moving forward, practitioners of obstetric/gynecologic ultrasound around the world are sure to see 3D/4D applications continue to have an increasingly important and pervasive role in everyday practice. Dr. Abu-Rustum's *Practical Guide to 3D Ultrasound* will help us get there.

NT



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# NICU Discharge Readiness and Preparation: Part 1: Discharge Readiness

By Vincent C. Smith, MD, MPH

Members of the NPA write a regular column in *Neonatology Today*.



I have always been struck by the incongruity that, in the Newborn Intensive Care Unit (NICU), we spend approximately \$1,000-\$5,000 per day to provide care for any given infant, yet we devote considerably less time, effort, and resources to helping families learn to care and provide for these infants after discharge home. The transition from the NICU to home changes a NICU family's entire world. How the discharge process occurs is vital to ensuring the competence and confidence of primary caregivers and a safe transition from NICU to home for infants and their families.

There are two related concepts involved in this transition process:

1. The discharge readiness of the families and
2. NICU discharge preparation is the process of facilitating discharge readiness to successfully make the transition from the NICU to home.

Discharge readiness is the desired outcome, and discharge preparation is the process.

## Discharge Readiness

The American Academy of Pediatrics (AAP) recommends the transition from the NICU to home occur when the infant achieves physiologic maturity and the family has participated in an active educational program for parental involvement and preparation for care of the infant at home. The hope is that with an active discharge preparation

program, parents will achieve discharge readiness.

Discharge readiness is an important milestone achievement. Studies in adult, pediatric, and neonatal populations have demonstrated that adverse outcomes are associated with not being prepared at hospital discharge. These adverse outcomes range from tangibles such as increased health care utilization and costs to less tangible, but equally important, factors such as greater difficulties with stress, recovery, self-care, confidence with self-care management abilities, coping with challenging family-related issues, obtaining necessary help and emotional support, and overall adjustment.

To minimize avoidable undesirable outcomes, a NICU must provide sufficient discharge preparation in order to assure that families are ready for discharge. Even in the cases of infants with complex medical problems, proper discharge preparation may potentially assuage health care costs by reducing the length of stay and decreasing post-discharge healthcare utilization (including unplanned provider visits, emergency room visits, and hospital readmissions), as well as family-associated costs (such as lost income due to missed work and out-of-pocket expenses). In addition, the psychological benefits of being comfortable with the care of their infant, having less parental stress and anxiety, and feeling confident in their abilities to manage at home are immeasurable.

In order to understand the discharge readiness of its families, it is important for a NICU to choose a method of assessment and to systematically measure and account for a family's risk for inadequate discharge readiness when planning discharge. This approach will, at a minimum, provide the NICU with a relative assessment of a particular family's discharge readiness compared to other families being discharged from the same NICU. This local data, when used in conjunction with known risk factors (including but not limited to substance abuse, inadequate prenatal care, teenage pregnancy, domestic violence, mental health issues especially anxiety or depression, limited English proficiency, and lower socioeconomic

status or illiteracy), can help to anticipate which families may experience more difficulties following discharge as well as who may benefit from greater in-hospital and post-discharge support for a successful transition home. Formalizing the assessment of discharge readiness could facilitate identification of families at risk for an adverse outcome, such as readmission or emergency room utilization, before the time of discharge when anticipatory interventions could potentially prevent unnecessary post-discharge healthcare utilization.

This argument is not meant to imply a causal relationship between discharge readiness and suboptimal outcomes. An alternative explanation is that factors which contributed to a family being unprepared for their infant to leave the hospital are similar to those that contributed to their risk of experiencing difficulties after discharge. To understand the exact nature of this relationship, more research is needed regarding ways to increase parental preparedness for discharge home from the NICU. It would also be helpful to repeat the studies that have already been done in different patient populations to test the robustness of the findings and the stability of the results.

Discharge readiness assessment should be a standard part of the discharge process. Each NICU should make every effort to ensure that parents are prepared for the discharge of their infant(s) in order to prevent subsequent untoward events. Additionally, NICUs should conduct regular evaluations of their existing discharge program to allow improvement over time.

## Take Home Points

- Making the transition from the NICU to home involves both discharge readiness and discharge preparation.
- The goal of discharge readiness is to equip primary caregivers to be competent and confident in caring for their baby at home in order to ensure a safe transition from the NICU to home for the baby and family.
- Lack of adequate discharge readiness can lead to adverse outcomes for babies, families, and the healthcare system that include financial,





physiological and psychological elements.

- Family discharge readiness should be formally assessed as part of discharge preparation.

We invite you to join the NPA in supporting mothers, babies, and families during the perinatal period. As an interdisciplinary team, we can work together to improve the care we are committed to provide. More information can be found at [www.nationalperinatal.org](http://www.nationalperinatal.org).

"ICU Discharge Readiness and Preparation: Part 2: Discharge Preparation" will be published in the *Neonatology Today's* November issue.

### Save the Dates

#### **2016 Annual Conference**

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#### **Multidisciplinary and Collaborative Perinatal Decision Making in the 21<sup>st</sup> Century**

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Texas Children's Hospital - Pavilion for Women, Baylor College of Medicine, Houston, TX



#### Selected Resources

- American Academy of Pediatrics Committee on Fetus and Newborn. *Pediatrics*. 2008;122(5):1119-26.
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#### NT



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## NEONATOLOGY TODAY

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- Optionally, a picture of the author(s) may be submitted.
- No abstract should be submitted.
- The main text of the article should be written in informal style using correct English. The final manuscript may be between 400-4,000 words, and contain pictures, graphs, charts and tables. Accepted manuscripts will be published within 1-3 months of receipt. Abbreviations which are commonplace in pediatric cardiology or in the lay literature may be used.
- Comprehensive references are not required. We recommend that you provide only the most important and relevant references using the standard format.
- Figures should be submitted separately as individual separate electronic files. Numbered figure captions should be included in the main Word file after the references. Captions should be brief.
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**NEONATOLOGY TODAY** is interested in publishing articles from Neonatologists, Fellows, and NNPs on case studies, research results, hospital news, meeting announcements, etc. Please submit your manuscript to: [Articles@Neonate.biz](mailto:Articles@Neonate.biz)  
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# Medical News, Products & Information

Compiled and Reviewed by Tony Carlson, Senior Editor

## Very Early Birth Linked to Introversion, Neuroticism, and Risk Aversion in Adulthood

Babies born very premature or severely underweight are at heightened risk of becoming introverted, neurotic, and risk averse as adults, indicates research published online in the *Archives of Disease in Childhood (Fetal & Neonatal Edition)*.

This personality profile may help to explain the higher rates of career and relationship difficulties experienced by this group as adults, suggest the researchers.

Very premature birth at less than 32 weeks and/or very low birthweight of less than 1500 g are known to be linked to a heightened risk of autistic spectrum behaviours, but it has not been clear if prematurity and low birthweight might affect other adult personality traits.

The researchers therefore compared the personality traits of 200 twenty-six year-olds who had been born very prematurely and/or

severely underweight with those of 197 young people who had been born at term and within the normal weight range.

They wanted to find out if there was a distinct personality profile linked to extreme prematurity/low birthweight, and if lower IQ--which is associated with very early birth-- explained any personality differences.

Study participants were either part of the Bavarian Longitudinal Study, which has been tracking the health and wellbeing of children born in 1985-6 in Southern Bavaria, Germany, and admitted to hospital within 10 days of birth, or those born at term in the same maternity units over the same timeframe.

Personality traits were assessed at the age of 26 across five dimensions: introversion; neuroticism (tenseness and anxiety); levels of openness to new experiences; agreeableness; and conscientiousness.

Adults who had been born very prematurely and/or extremely underweight scored significantly higher on all but two of the personality traits--conscientiousness and openness--than their peers born at term.

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Taking account of potentially influential risk factors did not alter the magnitude of these differences.

Adults who had been born very prematurely and/or extremely underweight also reported significantly higher levels of autistic spectrum behaviours, introversion, neuroticism, agreeableness and lower levels of risk taking.

The personality traits that best described the profile of adults who had been born very prematurely and/or extremely underweight were: introversion, risk aversion, autistic spectrum behaviours and neuroticism. The findings held true even after taking lower intelligence into account.

This cluster of traits describes a 'socially withdrawn personality,' or someone who is easily worried, less socially engaged, less interested in risk-taking, and less communicative, say the researchers.

"The higher scores of [very premature/low birthweight] adults on the socially withdrawn scale are most likely to be the result of alterations in their brain structure and functioning due to the amalgam of changes in brain development related to premature birth and prenatal and neonatal insult," write the researchers.

They go on to suggest that these children are likely to be exposed to considerable stressors in neonatal intensive care, which may affect brain development and adult adaptation, added to which early birth may prompt parents to be over-protective.

The physiological circumstances of these babies' births might help explain the higher rates of career and relationship difficulties in adulthood, say the researchers.

The evidence shows that many adults born very premature/low birthweight are less likely to go on to higher education or

get well-paid jobs; and they find it harder to make friends, find long term partners, and become a parent, the researchers point out.

### Admission Rates Increasing for Newborns of All Weights in NICUs

Admission rates are increasing for newborns of all weights in Neonatal Intensive Care Units (NICUs) in the United States, raising questions about possible overuse of this highly specialized and expensive care in some newborns, according to an article published online by *JAMA Pediatrics*.

The neonatal mortality rate has fallen more than four-fold (from 18.73 per 1,000 live births to 4.04 per 1,000 live births in 2012) since the first NICU opened in the United States 55 years ago to provide highly specialized care to premature and sick infants.

Few studies have looked beyond very low-birth-weight infants admitted to the NICU to examine how neonatal care relates more broadly to newborn care. A 2003 revision to the U.S. Standard Certificate of Live Birth includes a new field to indicate whether a newborn was admitted to the NICU, which allows researchers to study trends in neonatal intensive care for the majority of the U.S. newborn population across time.

Wade Harrison, MPH, and David Goodman, MD, MS, of the Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine at Dartmouth, Lebanon, NH, looked at data for nearly 18 million live births to U.S. residents from January 2007 through December 2012 in 38 states and the District of Columbia.

The authors found overall admission rates increased from 64.0 to 77.9 per 1,000 live

births and that admission rates increased for all birthweight categories.

More specifically, the study reports that in 2012 there were 43 NICU admissions per 1,000 normal birth-weight infants (2,500 to 3,999 grams), while the admission rate for very low-birth weight infants (less than 1,500 grams) was 844.1 per 1,000 live births.

From 2007 to 2012, NICUs increasingly admitted term infants of higher birth weights and by 2012, nearly half of all NICU admissions were for normal-birth-weight infants or for those born at 37 weeks gestation or older, according to the results.

The authors note they cannot say from their data whether the lower admission rates in 2007 or the higher rates seen more recently are closer to the correct rate.

"Newborns in the United States are increasingly likely to be admitted to a NICU, and these units are increasingly caring for normal birth-weight and term infants. The implications of these trends are not clear, but our findings raise questions about how this high-intensity resource is being used," the study concludes.

(*JAMA Pediatr*. Published online July 27, 2015. doi: 10.1001/jamapediatrics.2015.1305.

This study was supported, in part, by the Charles H. Hood Foundation. Please see article for additional information, including other authors, author contributions and affiliations, etc.

In a related editorial, Aaron E. Carroll, MD, MS, of the Indiana University School of Medicine, Indianapolis, writes: "Once again, it is critical to stress that the important work of Harrison and Goodman

## NEONATOLOGY TODAY

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does not prove that the increased NICU admissions we are seeing are fraudulent or even merely wasteful. It is entirely possible that the admissions are justified. However, there is no doubt that they are expensive and carry potential harm. If hospitals want to argue that NICUs are necessary, they will need to prove that the need exists, especially in light of the increasing share of infants admitted who are at or near full term. If hospitals are unable to demonstrate that NICUs are necessary, then it is very likely that, at some point in the near future, policies will force them to reduce those admissions, which will have major implications for NICU and hospital finances."

(JAMA Pediatr. Published online July 27, 2015. doi:10.1001/jamapediatrics.2015.1597).

### BoardVitals Raises \$1.1M to Build the Wikipedia of Medicine

BoardVitals, a rapidly growing healthcare startup based in New York City, announced in early August that it has raised \$1.1 million in Series A funding from Rock Creek Capital, a Salt Lake City-based growth equity fund. This follows initial seed funding from several investors, including: Blueprint Health, Rothenberg Ventures, and Charles Boorady, the number one healthcare investor, according to Forbes.

BoardVitals has rapidly gained market share by redefining a siloed industry, medical assessments and certifications, and the company has been on a growth tier since it was founded in 2013. BoardVitals has trained over 30,000 doctors and the product has been purchased by over 150 institutions in the past year alone. The company was also named the 'Most Promising Startup in New York' as the winner of the 2014 Gust Catapult startup contest.

"BoardVitals will revolutionize the training of health care professionals in a way that will improve the quality of their lives and the quality of care they provide," says Rick Stratford, a partner of Rock Creek Capital. "The exceptional talent and leadership of

Dan Lambert and Dr. Andrea Paul has propelled BoardVitals into a market-leader in healthcare education in less than two years."

Stratford will join the board of directors following the close of the Series A round. The board of directors also includes Greg Samios, former president of Kaplan Health and a long time adviser to the company.

"During my time working with Dan and Andrea, I have been extremely impressed by their ability to develop a unique assessment tool, which they have rapidly scaled across the healthcare marketplace," said Samios.

The founding team is no stranger to fast growth companies. BoardVitals CEO Dan Lambert is a Harvard Business School graduate who co-founded Pushpins, a mobile couponing app that was acquired in 2013. Dr. Andrea Paul, Chief Medical Officer, left her successful practice after 8 years of clinical experience to oversee content development. Dr. Paul was recently named one of 10 Disruptive Women in Life Sciences for her work on BoardVitals.

The company offers digital assessment tools that bring together medical content from major sources: publishers, research institutions, and more than 200 individual practitioners.

"It's not only about new technology, it's about building a new ecosystem for Medical Education," says Lambert. "For the first time medical content is not just peer reviewed, but it's now reviewed by hundreds of doctors within each specialty. Every piece of content on our platform is continually rated and we receive hundreds of feedback notices every week that ensure content is up to date."

BoardVitals is a healthcare education startup based in New York City that develops digital assessment tools and medical content to prepare physicians, nurses, and medical health professionals for specialty board exams and certifications. Bringing together content from major publishers, universities, and

leading healthcare providers, BoardVitals provides the largest and most up-to-date training ecosystem in medicine. The company uses machine learning and crowd curation to identify and improve medical knowledge as information is published. For more information, [www.boardvitals.com](http://www.boardvitals.com).

### Adult IQ of Very Premature Babies Can Be Predicted by the Age of Two

Newswise — Research from the University of Warwick indicates that the IQ of adults born very premature or of very low birthweight can be predicted when they are just a toddler.

The study was led by psychology researcher Professor Dieter Wolke.

Previous studies have linked very premature birth and Very Low Birth Weight (VLBW) with impaired cognitive function from childhood and throughout adulthood. However, until now, it wasn't clear how soon adult IQ can be predicted in these children.

Professor Wolke, who based at the Department of Psychology and Warwick Medical School, University of Warwick, said, "We believe this is the first time a research paper has looked into the prediction of the IQ of adults over the age of 26, who were born very premature or with Very Low Birth Weight."

"The results indicate that assessing two-year olds who were born very preterm or very underweight, and will provide a reasonably good prediction to what their adult IQ will be."

In contrast, the research results found that the IQ of adults who were born full-term couldn't be accurately predicted till the age of six.

Across all assessments within the study very premature and Very Low Birth Weight children and adults had lower IQ scores than those born full-term, even when individuals with severe cognitive impairment were excluded from the comparisons.





The research paper entitled, “Preterm Children’s Stability of Cognitive Function into Adulthood: A Prospective Cohort Study,” has been published by the American Academy of Pediatrics’ international journal *Pediatrics*, the most-cited in its field.

The study was conducted in southern Bavaria, Germany and followed children from birth into adulthood who were born between 1985-86. Called the Bavarian Longitudinal Study, data gained on cognitive function were assessed with developmental and intelligence tests (IQ) at five and 20 months and at four, six, eight and twenty- years of age.

Two-hundred-and-sixty babies born either very premature (before 32 weeks) or with very low birth weight (fewer than 1.5kgs) were compared with 229 babies who born full-term. Their results were not sex-specific, related to income or education, and were compared to the control group of adults who were born healthy in the same obstetric wards.

Professor Wolke added, “Some children born very premature or with very low birth-weight score low on cognitive tests, but beat the odds and improve into adulthood.”

“However, many with persistent problems can be detected in the second year of life. Early identification of cognitive problems in these children may help to plan specialised therapeutic and educational interventions to help them and their families.”

Prof. Wolke, who is based at the University of Warwick’s Department of Psychology and at Warwick Medical School, conducts research into areas including epidemiology, trials of complex interventions at individual, family and community levels, and understanding socio-cultural and environmental determinants of mental health and wellbeing.

### Medical Terms Lead to Divide Between Parents and Doctors

Newswise - Few things are more stressful than dealing with a sick child. From

discussing treatment with a pediatrician to complying with day care policies, a parent must consider many factors when making a decision about their child’s health. Now, a recent study from the University of Missouri and the University of Michigan is shedding light on the significant divide that can exist between patients and physicians about the same terminology—especially when it comes to discussing “pink eye,” a particular flashpoint in childcare.

At least 2 million children with conjunctivitis, or “pink eye,” visit a health care provider each year. Those visits can be quite confusing for parents as they communicate their child’s symptoms with pediatricians, especially since not all visits will require antibiotics as treatment. The study, by Laura Scherer, Assistant Professor of Psychological Sciences in the College of Arts and Science at MU, finds that the “pink eye” label, when applied to eye symptoms, can mislead parents into wanting antibiotics, even after being informed that the antibiotics are unnecessary.

“When it comes to communication between doctors and patients, words matter,” Scherer said. “Likewise, our beliefs matter. Many parents believe that ‘pink eye’ is a serious infection that requires antibiotics. But for pediatricians, the words ‘pink eye’ could mean a bacterial infection, viral infection, or even just redness due to allergy. If doctors use a label that leads parents to believe that the symptoms require medication, then parents are likely to demand it. Our study showed that these labels may cause parents to want medication even when the doctor tries to later communicate that medications aren’t necessary.”

In the study, Scherer and her colleagues at the University of Michigan asked 159 parents to read short vignettes that described a two-year-old child who developed a red eye following mild cold symptoms. The symptoms described were suggestive of viral conjunctivitis: watery discharge and eye redness confined to the eyeball and small part of the eyelid. In this situation, antibiotics would likely have little to no value.

In the vignette narrative, parents were then presented with randomized scenarios. In one version, the physician affirmed the “pink eye” diagnosis, in another, the physician simply called the symptoms an “eye infection.” Researchers found that parents who received the “eye infection” label only wanted antibiotics when they believed that antibiotics would be effective. However, parents who were given the “pink eye” label wanted antibiotics regardless of whether they were told that antibiotics were ineffective or not.

“Physicians may not realize that the words they use have different connotations to them than they do to patients,” Scherer said. “This kind of miscommunication can potentially lead to overuse of antibiotics, which is causing increased antibiotic resistance. Past studies of primary care physicians have found that they prescribe antibiotics in 70% to 90% of eye infection cases, far exceeding the proportion of actual bacterial cases. Our study suggests that the words ‘pink eye’ makes parents believe the infection to be more contagious and to want medication even when it isn’t necessary.”

Scherer advises that physicians can overcome this communication divide by understanding the effect the term “pink eye” has on parents’ expectations for treatment. Likewise, parents should ask clarifying questions if the treatment options presented to them conflict with their expectations, Scherer said.

“As soon as parents hear the words ‘pink eye,’ their minds fill with fear, and they think, ‘my child needs antibiotics,’” says senior author Beth Tarini, Assistant Professor of Pediatrics at the University of Michigan’s C.S. Mott Children’s Hospital and a researcher at the Child Health Evaluation and Research Unit. “As pediatricians, we need to recognize the impact that our words have on parents, and how it affects their thinking about treatments that may be unnecessary.”

The study, “Effect of ‘Pink Eye’ Label on Parents’ Intent to use Antibiotics and Perceived Contagiousness,” was recently published in *Clinical Pediatrics*.



Scherer co-authored the study with Beth Tarini, an Assistant Professor in the University of Michigan Department of Pediatrics and Communicable Diseases, with funding from the National Institute for Child Health and Human Development (K23HD057994). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.

### Studies Find That Delayed Umbilical Cord Clamping May Benefit Some High-Risk Newborns

Newswise — Clamping and cutting of the umbilical cord happens within 10 seconds after birth in most cases, in part so members of a medical team can more quickly begin caring for a newborn. But research from Nationwide Children’s Hospital shows that waiting 30 to 45 seconds to clamp could have advantages for extremely preterm infants.

The study, published online on September 24<sup>th</sup> in the *Journal of Perinatology*, found that the preterm infants with delayed cord clamping had higher blood pressure readings in the first 24 hours of life and needed fewer red blood cell transfusions in their first 28 days than infants whose umbilical cords were immediately clamped. In addition, the short delay made no difference in the safety of the infant immediately after delivery.

The study examined 40 infants who were born at a gestational age between 22 and 27 weeks. A baby is considered to be full term at 39 weeks; 22 weeks is considered the limit of viability. The average birth weight of the babies studied was approximately 1.4 pounds.

“Infants born prior to 28 weeks gestation represent a high-risk subgroup, so efforts to improve outcomes remain critically important,” says Carl Bakes, MD, a cardiologist and neonatologist at Nationwide Children’s and lead author of the study. “There is increasing evidence that delayed cord clamping may give infants in many categories a better chance.”

Dr. Backes also led a study, published in July in the *Journal of Perinatology*, which found delayed cord clamping may be beneficial for newborns with critical congenital heart disease. In that study, infants whose umbilical cords were clamped approximately two minutes after birth needed fewer red blood cell transfusions than infants whose cords were clamped within 10 seconds.

The delay allows for an increased blood volume in the baby, which likely improves pulmonary blood flow and other circulatory measures, stabilizing blood pressure. This may be particularly important for infants with Critical Congenital Heart Disease according to Dr. Backes, who is also an Assistant Professor of Pediatrics at The Ohio State University College of Medicine.

## FEBRUARY MEDICAL MEETING FOCUS

### NEO: The Conference for Neonatology

February 24, 2016 – CQI Symposium

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Vinod Bhutani, MD; Ronald Bloom, MD; Catherine Cropley, RN and Dharmapuri Vidyasagar, MD.

#### NEO Conference Topic Themes (presented by foremost experts in the field):

- The Fetal Patient, Neonatal Hematological Problems
- Nutritional Issues in the NICU
- Current Concerns in Neonatal Infections
- Oldies but Goodies in the NICU—A Modern Assessment of Some Older Therapies
- Medication Dilemmas in the NICU

#### Pre-Symposium (CQI Symposium):

For developing sound quality improvement initiatives in the NICU.

#### Specialty Review Course (Runs concurrently with NEO):

- For those preparing for upcoming Board examinations, or want a concise, thorough review of Neonatology.



“Further research is needed in both of these infant populations to see whether the short-term benefits translate to reductions in long-term morbidity,” Dr. Backes says. “The early results are promising, though.”

### Study Shows Potential Benefit of Telehealth Visits For Postoperative Care

Most veterans undergoing general surgical operations of low complexity preferred telehealth (video or telephone) follow-up than visiting a clinic, and data suggested that telehealth visits may help identify veterans requiring in-person assessment or further care, according to a study published online by *JAMA Surgery*.

There is increasing interest in telehealth as a means to improve access to care and decrease costs associated with patients traveling for traditional face-to-face encounters. This is especially important in the Veterans Health Administration patient population. Michael A. Vella, MD, of the Veterans Affairs Medical Center and Vanderbilt University, Nashville, and colleagues conducted a study to measure the quality of telehealth visits and the preferences for post-operative general surgical care among veterans with regard to telephone, video, and in-person postoperative visits.

From May to July 2014, the researchers selected a sample of veterans undergoing operations of low complexity amenable to postoperative telehealth evaluation. Each eligible veteran was evaluated at 3 sequential visits: telephone, in-person, and video that addressed 4 domains (general recovery, follow-up needs, wound care needs, and complications). After completing all 3 types of visits, veterans were asked about their preferences regarding them.

Thirty-five veterans agreed to participate, and 23 veterans completed all 3 types of visits. There was 100% agreement across all 3 types of visits in the domains of general recovery and follow-up needs. Percentage of agreement for wound needs and complications was 96%, reflecting a possible infection reported during a telephone call that was not present during the in-person clinic or video visit. One veteran had a wound infection that was detected during telephone and video visits and confirmed during the in-person visit. There were no instances in which a wound or postoperative complication was not detected by telephone or video.

The majority of veterans (69%) preferred a telehealth visit (39% preferred the telephone, and 30% preferred video). Veterans who preferred telehealth visits traveled farther than those who preferred in-person visits (162 vs 75 miles).

“The data suggest that telehealth visits, either by telephone or video, can identify veterans requiring in-person assessment or further care. A telehealth follow-up program with further evaluation of patient outcomes is being trialed at our facility. This

## Upcoming Medical Meetings

### Innovations in Neonatal Care: Neonatal Neurology – Perspectives from Inside and Outside the Womb

Nov. 9-11, 2015; San Antonio, TX USA

[www.innovationsconference.com](http://www.innovationsconference.com)

### Miami Neonatology - 38<sup>th</sup> Annual International Conference

Nov. 11-14, 2015; Miami, FL USA

[pediatrics.med.miami.edu/neonatology/international-neonatal-conference](http://pediatrics.med.miami.edu/neonatology/international-neonatal-conference)

### World Prematurity Day Special Symposium & Public Event

Nov. 12-15; Kuala Lumpur, Malaysia

[klinc.org.my](http://klinc.org.my)

### 4<sup>th</sup> Nile Basin Pediatrics Congress

Dec. 2-5, 2015; Hurghada, Egypt

Phone: 01285775311

### Hot Topics in Neonatology 2015

Dec. 6-9, 2015; Washington, DC USA

[www.hottopicsonneonatology.org](http://www.hottopicsonneonatology.org)

### 2016 NeoPREP - An Intensive Review and Update of Neonatal-Perinatal Medicine

Jan. 23-29, 2016; Atlanta, GA USA

[shop.aap.org/2016-NeoPREP-An-Intensive-Review-and-Update-of-Neonatal-Perinatal-Medicine](http://shop.aap.org/2016-NeoPREP-An-Intensive-Review-and-Update-of-Neonatal-Perinatal-Medicine)

### Specialty Review in Neonatology

Feb. 23–28, 2016; Orlando, FL USA

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### CQI Symposium

Feb. 24, 2016; Orlando, FL USA

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[2016.worldneonatology.com](http://2016.worldneonatology.com)





has implications for waitlist management, costs, and access to care for veterans and the Veterans Affairs health care system," the authors write.

(JAMA Surgery. Published online September 23, 2015. doi:10.1001/jamasurg.2015.2660.

### Study Finds Little Improvement in Mortality Rate for Extremely Preterm Infants since 2000

About 500,000 babies are born premature in the United States each year, according to the U.S. National Library of Medicine. Those infants, born before 37 weeks of gestation, will likely deal with the threat of numerous complications or even death.

Accurate data on how those infants fare is important as doctors and parents face difficult decisions. Dr. Michael Malloy, a neonatologist and professor at the University of Texas Medical Branch at Galveston, recently took a closer look at the infant mortality rates of extremely preterm infants.

What Malloy found and described in a paper in Journal of Perinatology was that while there were significant improvements in the infant mortality rate among extremely preterm infants before 2000, there has been little improvement since the turn of the century.

Previous studies looking at extremely preterm infants - babies born after only 22 to 28 weeks of gestation - typically only look at short periods of time, and often use data from specialized centers with the latest technology and treatments, Malloy said.

But to get a broader view, Malloy looked at infant birth and death certificates from the National Center for Health Statistics, and compared the mortality rates from 1990 to 2000, and then from 2000 to 2010. He looked at more than 47,000 records and tracked the infant mortality rate for each week of gestation from 22 to 28.

What Malloy found was that there was a 40% to 50% reduction in death for each gestational week from 1990 to 2000.

For example, the mortality rate of preterm infants born after 23 weeks of gestation decreased from 81.4% in 1990 to 67.8% in 2000. For babies born after 28 weeks the mortality rate dropped from 9.5% in 1990 to 6 % in 2000.

"We see a marked improvement across all these gestation ages," Malloy said.

But from 2000 to 2010 there was little to no improvement in the mortality rate, he said.

The difference may be related in part to the advances made in the 1990s. Advances such as the use of synthetic surfactant to prevent breathing disorders and the antenatal steroids likely helped reduce the mortality rate, Malloy said.

But while improvements to techniques and technology have been made since 2000, there have been no great breakthroughs or new discoveries, Malloy said. And the mortality rate from 2000 to 2010 has not improved dramatically.

Malloy said he points out these trends to help both doctors and expecting parents have realistic information when it comes to extremely preterm infants.

"It is attempt to temper public expectations," Malloy said. "We just can't work complete miracles. We have to accept the fact that there is a biology that we are running up against."



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# NEONATOLOGY TODAY

News and Information for BC/BE Neonatologists and Perinatologists

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