PSNet
PATIENT SAFETY NETWORK

Statewide Telehealth Program Enhances Access to Care, Improves Outcomes for High-Risk Pregnancies in Rural Area

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Summary

Formerly known as the Antenatal and Neonatal Guidelines, Education and Learning System (ANGELS), the University of Arkansas for Medical Sciences (UAMS) High-Risk Pregnancy Program links clinicians and patients across the state with UAMS, where the vast majority of the state's high-risk pregnancy services, maternal-fetal medicine specialists, and prenatal genetic counselors are located. The program facilitates real-time telehealth consultation for patients, local physicians, and medical center specialists through a statewide telemedicine network; develops and disseminates guidelines to foster the use of best practices by obstetric providers across the state; and facilitates appropriate referrals to the medical center for tertiary care through a 24/7 patient/provider call center. The program has enhanced access to specialty perinatal care, including maternal-fetal medicine consultations and tertiary level obstetric care, which, in turn, has reduced complications, generated cost savings to the state Medicaid program, and led to high levels of patient satisfaction. The High-Risk Pregnancy Program has reduced Arkansas' 60-day infant mortality rate by 0.5 percent due to increasing the proportion of low-birthweight infants delivered at the medical center.

See the Description section for information about number of guidelines and new services; the References section for one new source of information; the Results section for updated information about consultations, guidelines, and website activity; and the Resources section for updated staffing information.

Disclaimer

This innovation was identified by the AHRQ PSNet Editorial Team from the AHRQ Health Care Innovations Exchange. That resource, established by AHRQ in 2008, was retired in March 2021; AHRQ now offers select content from the Innovations Exchange, including its downloadable databases, through a microsite. This particular innovation was identified by the Editorial Team as one of continued interest and importance

to AHRQ PSNet users and therefore was selected to be updated and included in this new section of the AHRQ PSNet website. To prepare this updated summary, the Editorial Team worked closely with representatives associated with the innovation. Updates include updating the name of the innovation, additional programs and services offered under the innovation, additional results information, new tools and resources, additional publications, and ensuring accurate contact information.

Contact the Innovator

Curtis Lowery, MD

University of Arkansas for Medical Sciences
Director, ANGELS/Chair, Institute for Digital Health & Innovation
LoweryCurtisL@uams.edu

For general inquiries, please contact (866) 273-3835 or IDHI@uams.edu.

Date First Implemented

2002-01-01

Problem Addressed

High-risk pregnancies are common in rural areas, often leading to the delivery of low- or very low-birthweight babies, which, in turn, increases the baby's risk of long-term health and developmental problems. Low birthweight is often the result of inadequate prenatal care,[1] a shortcoming common in poor and rural areas where women have limited access to maternal-fetal medicine specialists and other specialized services.

- **High-risk pregnancies and low birthweight as common problems:** High-risk pregnancies often result in the delivery of low- and very low-birthweight In fact, rates of low- and very low-birthweight babies in Arkansas (a state with a high poverty rate and many rural residents) are among the highest in the nation.[2,3] In 2017, 9.3 percent of babies delivered in Arkansas were low birthweight (2,500 grams or less), a full percentage point above the national average.[4] In FY 2019, UAMS received 451 high-risk maternal transports.

- **High maternal mortality compared to national average:** According to the Centers for Disease Control and Prevention, Arkansas has the third-highest maternal mortality rate in the nation. While the national average is approximately 20 maternal deaths per 100,000 live births, Arkansas' rate far

exceeds that at 35 deaths per 100,000 live birth.[5]

Limited health care access as partial cause: In Arkansas, 73 of 75 counties are designated as either partially or fully medically underserved.1 As a result, many pregnant women in Arkansas, especially those living in rural areas, have limited access to specialty prenatal care, including maternal-fetal

Description of the Innovative Activity

The High-Risk Pregnancy Program links patients and clinicians across the state with the medical center, where the vast majority of the state's high-risk pregnancy services, maternal-fetal medicine specialists, and prenatal genetic counselors are located. The program facilitates consultation for patients, local physicians, and medical center specialists; develops and disseminates guidelines to promote use of best practices by obstetric providers across the state; utilizes a statewide telemedicine network; and facilitates appropriate referrals to the medical center for tertiary care. Key elements of the program include the following:

- **Call center:** The call center, staffed by women's health registered nurses (RNs) 24 hours a day, serves as the single point of entry into the medical center’s obstetric services for both patients and physicians. Physicians contact the call center to arrange telemedicine consultations with medical center maternal fetal medicine specialists or to coordinate transport of high-risk patients to the center for care. Patients may contact the call center with questions related to pregnancy, labor and delivery, or postpartum needs. Call center services include telephone triage and advice based on evidence-based guidelines and algorithms, referral to medical center physicians and appointment scheduling, and arrangement of emergency transportation to the center or to the nearest, most appropriate facility.
- **Case management/follow-up care:** Hospital discharge data are used to generate lists of patients to receive case management and follow-up care by call center RNs. In addition, medical center physicians may electronically “flag” an individual patient for follow-up calls at a specified time interval. RNs call postpartum patients within 24 hours of discharge and antepartum patients who have been referred to the center within 24 hours of referral. RNs continue to follow up with patients as many times as needed.
- **Real-time telemedicine consultation with medical center clinical experts:** The High-Risk Pregnancy Program provides interactive video telemedicine equipment at no cost to approximately 44 hospitals and clinics and 26 nurseries across Arkansas. Through this virtual clinic, women with high-risk pregnancies can receive real-time level II ultrasounds with on-the-spot consultation from specialists. Local physicians can refer any patient for whom concerns exist. On assessment, patients with complex, high-risk conditions continue to receive High-Risk Pregnancy Program care. The program empowers local providers to retain and care for their patients while simultaneously delivering the specialty expertise found at the state's only academic medical center. The majority of referrals continue to be managed locally, but patients with abnormal findings may be referred to the center for additional care or for delivery of the baby.

- **Ongoing development, refinement, and distribution of guidelines:** As of April 2020, the medical center's maternal fetal medicine and neonatology divisions, in collaboration with physicians across Arkansas, have developed 108 obstetric and 65 neonatal guidelines and protocols that encourage use of standardized best practices. Medical center clinicians review current literature and existing guidelines and then refine those guidelines to incorporate special considerations for the rural practice environment (e.g., cases in which Arkansas physicians do not have access to a recommended technology or intervention). Physicians review guidelines for discussion and refinement, with a periodic review and update based on weekly statewide teleconference discussions, Internet-based feedback forms, and formal and informal communications between community obstetricians and medical center specialists. Finalized guidelines are available on the program website, and DVD copies of new guidelines are distributed yearly to all obstetric providers in the state.
- **Weekly provider education:** The program uses interactive audio/video teleconference equipment placed at 60 locations around the state to provide weekly educational conferences to interested clinicians. Sessions include live sessions, interactive videos, teleconferencing, and continuing education modules. Sessions offer lectures, discussions of guidelines, or case presentations to help physicians understand and use best practices. Sessions focus on the following types of clinical topics: high-risk obstetrics, general neonatal care, obstetric/neonatal nursing care, obstetrics/gynecology case discussions, fetal anomaly management, pediatrics, and childhood obesity. There is also a focus on national programs, such as Sugar/Safe-Temperature-Airway-Blood Pressure-Lab-Emotional Support (STABLE), Neonatal Resuscitation Program (NRP), and Association of Women's Health, Obstetric and Neonatal Nurses Fetal Heart Monitoring (AWHONN FHM). In the 2018-2019 report, the High Risk Pregnancy Program held 250 live teleconferences and events and awarded 4,715 hours of continuing education.
- **Additional services:** The High-Risk Pregnancy Program offers the following services:
    - **Secondary newborn screening:** Provides secondary testing of all positive newborn screens (i.e., screening tests with a concerning result) in Arkansas. Patients with a positive secondary test are then connected with the appropriate medical team for management.
        - **Breastfeeding education:** Provides breastfeeding education for providers and mothers through leadership, participation with various outreach efforts, and education modules.
        - **Education for diabetes in pregnancy:** AADE DEAP accredited program that addresses diabetes care for pregnant women throughout the state of Arkansas, including telemedicine consultations and nutritional education.
    - **Telepsychiatry:** In 2012, began providing mental health care and support for substance use disorders to those who are pregnant or postpartum.
    - **HIV telemedicine:** Implemented in 2012 to improve patient HIV care, including care for newly diagnosed women and ongoing management in pregnancy.
    - **Fetal diagnosis and management:** Provides prenatal diagnosis and management of fetal anomalies prior to delivery, during delivery, and after birth. The program ensures that birth occurs at the appropriate care facility and provides a seamless transition between pregnancy care and intensive care for the neonate.

- **Levels of care:** Leads the effort to designate levels of care for obstetrics and neonatology in hospitals across the State. Arkansas is one of three states in the nation to implement these levels.
- **Simulation training:** Travels to the state's outlying hospitals with a life-size mannequin that simulates any number of birthing complications and allows for simulated drills of complex pregnancies and emergency services to improve training for health care professionals in rural areas.
- **Boot camp:** Assists new NICU nurses in understanding basic concepts associated with neonatal physiology and care in an intensive training environment.
- **Certification courses:** Offers certification review courses in conjunction with the UAMS Women and Infants Service Line for nurses who have specialty experience with inpatient obstetric patient care.
- **POWER Initiative**: In collaboration with the Arkansas Department of Human Services, the Perinatal Outcomes Workgroup through Education and Research (POWER) is an initiative of 39 delivering hospitals in Arkansas collaborating to reduce maternal mortality and morbidity by implementing maternal safety bundles. The maternal safety bundles currently being implemented in the state include bundles for hypertensive emergency in pregnancy, postpartum hemorrhage, and racial disparities, modeled after bundles created by the California Maternal Quality Care Collaborative. Continuing education regarding bundle implementation and team-based simulation training is offered to all collaborating hospitals, especially in rural areas. Of the 39 delivering hospitals, all hospitals have >60% completion of the postpartum hemorrhage bundle, with 16/39 reporting >90% completion. For hypertensive emergencies, 37/39 facilities have >50% completion, with 16/39 reporting >90% completion.

Context of the Innovation

The University of Arkansas for Medical Sciences, located in Little Rock, is one of two board-certified maternal–fetal medicine units in the state that offer specialized services for women with high-risk pregnancies, low- and very low-birthweight babies, and those with fetal abnormalities. The medical center, which employs three of the state's eight board-certified maternal-fetal medicine specialists, handles approximately 3,500 births per year in its 14-bed labor/delivery unit. It also has a 64-bed neonatal unit, and additional neonatal beds are located at Arkansas Children's Hospital, the pediatric hospital affiliated with the center. The medical center, the Arkansas Department of Human Services, and the Arkansas Medical Society united missions to launch the program as a practice management system for perinatal care, providing the medical center with the resources needed to offer high-risk, specialty obstetric care to Arkansas' rural families. With Arkansas Medicaid oversight, the program uses telehealth conferencing to reach throughout Arkansas' medically underserved areas.

Results

The High-Risk Pregnancy Program creates enhanced access to high-quality perinatal care, including maternal fetal medicine consultations and tertiary obstetric care for high-risk cases, which, in turn, has reduced complications, generated cost savings, and produced a positive return on investment. The program has reduced the 60-day infant mortality rate by increasing the proportion of low–birth-weight infants delivered at the medical center. Participating patients report high satisfaction with the program and its telehealth services.

- **Enhanced access to consultations:** Since the implementation of the High-Risk Pregnancy Program in 2003, the vast majority of women in Arkansas live fewer than 60 miles from a location where they can be “seen” by a medical center expert via telemedicine. The number of medical center telemedicine consultations increased from fewer than 50 in 2000, to 3,306 in 2010, 3,866 in 2011, 4,894 in 2013, and 2,635 in the 2018-2019 fiscal year. The 24/7, RN-staffed call center received and made more than 123,256 triage calls in 2010 alone, 132,239 in 2011, 206,481 in 2013, and 110,549 in the 2018-2019 fiscal year. 541 high-risk maternal transports were facilitated to the closest, most appropriate hospital in 2011, 554 in 2013, and 451 in the 2018-2019 fiscal year.
- **Significantly enhanced access to tertiary services for women with high-risk pregnancies:** Since the implementation of the program, there has been an overall increase in NICU delivery levels. From 2005 to 2010, 3,856 women with high-risk pregnancies and in need of tertiary care were transferred to the medical center. Many of these women would not have been transferred in the absence of the program. Among patients residing more than 80 miles from the center, the proportion of infants weighing less than 1,000 grams who were delivered at the hospital increased by 15 percent, from 40.7 percent in 2001 to 46.8 percent in 2004.[1] The likelihood of a Medicaid beneficiary delivering a premature or low–birth-weight infant at the center (as opposed to somewhere else that is less well equipped to handle the case) has increased by 42 percent since the program began. In FY 2016, NICU delivery levels increased to more than 70% for babies born before 28 weeks of completed pregnancy and to more than 60% for babies between 33 and 36 weeks of completed pregnancy. Additionally, the rate of postpartum complications in Medicaid patients has decreased significantly.
- **Fewer complications, leading to positive return on investment:** The consultations and more specialized care provided to women at high risk have resulted in fewer medical complications, leading to savings for the Arkansas Medicaid program.
- **Reduced infant mortality:** The program has reduced the 60-day infant mortality rate by 0.5 percent by increasing the proportion of low–birth-weight infants delivered at the hospital from 37.7 to 42.1 percent.
- **Improved diabetes management while pregnant:** Since 2015, the program has offered diabetes consultations for pregnant women diagnosed with diabetes. Between 2016 and 2017 there was a 38% increase in the number of women with diabetes whose cases were managed via telemedicine. The women in this program have demonstrated improved glycemic control throughout the course of their pregnancies.
- **High patient satisfaction:** All patients receiving the program’s telemedicine consultation services indicated they were happy with their digital appointments, and 94% state that their digital health

provider always explained things in a way that they understood. Approximately 90% of survey respondents also indicated that scheduling the digital health appointment was easy to do. Patients reported shorter travel time to digital health appointments versus in-person clinic visits, saving each patient on average $75-$150.

- **Other accomplishments:** Other accomplishments include the following:
    - **Transports for maternal care:** In 2010, the program facilitated 619 maternal transports to the most appropriate hospital. In 2011, 541 transports. In 2013, 554 transports. In 2018, 451 transports.
    - **Access to rural sites:** Since 2003, the program has fully equipped 38 rural sites with telemedicine technology or teleconferencing equipment.
    - **Guideline development:** The High-Risk Pregnancy Program has finalized 173 obstetric and neonatal evidence-based guidelines as of April 2020, which are available free on the program website.
    - **Active web site:** The program website initially reported having 3,980 registrants, 2,118 within Arkansas. In 2012 alone, 4,204 people visited the website, of whom 1.7 percent were international visitors. In 2013, there were 4,583 hits to the website, from 44 States and 25 countries. In 2014, there were 3,778 registrants, 1,141 of whom were physicians. As of 2019, over 2,000 healthcare providers use this resource to access the obstetrical and neonatal guidelines. During FY 2019, the website reported 24,429 views, with registrants from 65 of Arkansas' 75 counties, 47 states and D.C., and 34 countries.

Innovation Patient Safety Focus

Increasing access to specialized obstetric services for patients in rural communities via telehealth reduced patient safety events associated with high-risk pregnancies.

Evidence Rating

Moderate: The evidence consists of before-and-after comparisons of key outcomes, including access to consultation and tertiary services, along with post-implementation satisfaction rates and cost savings estimates.

Planning and Development Process

Key elements of the planning and development process include the following:

- **Obtaining approvals from key stakeholders, including senior leadership:** The medical center collaborated with Medicaid leaders to design and formalize a care management program for obstetric care that would be covered by the Medicaid program. Program advocates also explained the initiative to the center's senior leaders, obtaining their approval to sign a contract with Medicaid. The

medical center's government relations staff and Medicaid representatives met with state legislators to explain the contract, which was later approved by the full legislature.

- **Obtaining buy-in from private physicians and community hospitals:** The High-Risk Pregnancy Program built relationships with rural practitioners through a full-time, dedicated outreach coordinator. Program outreach efforts focused on cultivating trust and understanding of telemedicine through onsite visits to rural clinics, phone calls to maintain frequent contact, and demonstrations of telemedicine interactivity and derived benefits. The outreach coordinator emphasized that providers would retain their patients, still serving as their primary care provider, whereas the program would facilitate needed high-risk care through telemedicine and at the medical center, as needed. In finding rural telemedicine champions and pioneers in Arkansas, program representatives met with hospital administrators, family practitioners, and obstetricians at rural hospitals and private practices. For those providers who demonstrated a genuine interest, program leaders installed telemedicine consultation equipment and began offering services at their facilities.
- **Purchasing equipment:** The High-Risk Pregnancy Program purchases and installs telemedicine equipment at interested hospitals after a full assessment of the individual facility's technology needs. The program’s technologists provide full setup and training for the provided, free-of-charge equipment. The program also secures equipment through grants and awards as a means to expand its partnerships.

Resources Used and Skills Needed

- **Staffing:** Total staffing for the program is approximately 120 paid personnel, including five maternal–fetal medicine physicians; one maternal–fetal medicine fellow; advanced practice nurses; call center RNs; and other physicians, nurses, nurse practitioners, technologists, and support personnel. The program adds to its staffing needs by paying a percentage of specialists' salaries so that they may contribute to care as needed.
- **Training:** Participation in the program required staff training and familiarity with the software and other technology that allowed for remote consultation with patients. This may have also included guidance regarding patient engagement and interaction via electronic platforms.
- **Costs:** Data on program costs are unavailable. Renewing annually, the program contract dedicates the majority of funding toward the telemedicine infrastructure, equipment, and personnel required to deliver this service to rural Arkansas.

Funding Sources

- **Development funding:** Program development was funded by an Arkansas Medicaid contract, which evolved into ongoing programmatic support. The High-Risk Pregnancy Program is also the recipient of numerous grants and awards that have allowed development and expansion of the program and its related elements.

- **Ongoing funding:** The Arkansas Medicaid program funds a contract for the management of patients covered by Medicaid. Program services provided to commercially insured patients are reimbursed on a fee-for-service basis. The program expands its services through federal, state, and foundation grants, which enable this program to pilot new interventions and reach new patient populations in Arkansas.

How They Did It Tools and Resources

Program guidelines are available at https://angelsguidelines.com/. Additional printable resources addressing topics such as the flu, safe sleep, zika, and suggested management for high-risk pregnancy cases are available at: https://angels.uams.edu/healthcare-providers/digital-resources/.

Getting Started with This Innovation

- **Consider a site visit:** Potential adopters from across the state, nation, and world may contact the program to arrange a site visit. Program efforts in training and dissemination of its model program enabled the University of Arkansas for Medical Sciences to receive a grant award in 2010 for designation as the South Central Training Resource Center by the Health Resources and Services Administration Office for the Advancement of Telehealth. The fully equipped training center provides online and hands-on telemedicine training to its visitors. The center concentrates on promoting telemedicine education in Arkansas, Mississippi, and Tennessee. Through this virtual and actual training center, visitors can learn about telemedicine technology and how to replicate the program innovation within their own practices. Those interested are invited to contact the High-Risk Pregnancy Program for details on how they can adapt the model program to their patients' needs.
- **Build relations with multiple stakeholders:** Adopters should explain the program to and build relationships with insurance company representatives, university administrators, community physicians, community hospital leaders, and patients. Building relationships with community physicians is especially important, as they may feel threatened by perceived competition from the program. The High-Risk Pregnancy Program has allied with other hospitals, the state's health department, community health centers, mental health centers, the state's hospital association, and other health care agencies in the effort to expand the interoperability of telemedicine networks and technology infrastructure, ensuring greater potential to meet the needs of more patients.
- **Emphasize the potential for better patient care:** When reaching out to stakeholders, adopters should emphasize the program's potential to improve care for patients and reduce infant mortality. Better quality of health care should be the primary goal and should take precedence over other stakeholder concerns.
- **Understand the financial implications:** Would-be adopters need to analyze and highlight the program's impact on hospital finances. The medical center now cares for more Medicaid patients as a result of the initiative.

Sustaining This Innovation

Over its 17 years in operation, the High-Risk Pregnancy Program has gained a number of valuable lessons learned that are particularly advantageous when reviewing this innovation for replication in other areas and practices. Sustaining a telemedicine system such as this requires continued efforts in fortifying existing partnerships and cultivating new collaborations, even among other agencies that may be considered competitors. Centered on the improved quality of health care and patient outcomes, sustainability efforts must merge diverse and similar organizations in the mission to expand telemedicine services into new facilities and areas. The following lessons learned offer guidance in launching and sustaining this innovation:

- **Identify available resources:** Although available resources will vary, the program thrives due to strong intra-institutional support and legislative affairs liaisons located at the state's academic medical center, Medicaid leaders, senators, and representatives. It is especially important to remain aware of often-changing state telehealth laws.
- **Educate:** To secure partnerships, each entity must learn telemedicine's medical, budgetary, and human impacts for patients and constituents. It is important to operate within each partner's missions to guarantee buy-in.
- **Illustrate cost effectiveness:** After explaining how telemedicine benefits end users, program adopters should explain how technology creates advantages for the partnering entity. Adopters can help partnering entities compare the costs of telemedicine implementation and expenses of current patient management. To win partners, the High-Risk Pregnancy Program explored the outcomes of late prenatal care and its ongoing costs of managing fragile infants.
- **Seek pilot funding:** Whether through Medicaid contracts, state appropriations, federal grants, or institutional funding, program adopters need to draft a budget to pilot the idea, leveraging resources wherever possible.
- **Highlight successes:** It is important to keep the public aware of the program's services by using a dedicated outreach specialist. Adopters should welcome others to visit their model program and should also pursue awards, grants, and publications. With an established telemedicine infrastructure, any possibility is open, including geographic and service-based expansion.

Adoption Considerations Scale Up and Spread

Every month, the program hosts representatives from various universities and programs who want to learn more about its model of care.

Adoption Considerations Lessons Learned

Because of the program's value and potential for replication across the nation, the High-Risk Pregnancy Program was selected to be a core member of the Agency for Healthcare Research and Quality Medicaid Care Management Learning Network in 2005. Over the years, it has been realized that it is difficult to

implement changes without getting buy in from key stakeholders. Explaining to professionals how the tools and tips provided help improve maternal outcomes improves compliance with the program and supports implementation, along with the ease of use and access to telehealth services. Many of the reasons that programs may choose to not join have been uncovered so that they can be addressed, such as limited resources, no staff engagement, etc. The future of maternal mortality and morbidity can be change with continued development of programs like POWER and the utilization of technology by all key stakeholders.

Adoption Considerations Use by Others (Use By Other Organizations)

The High Risk Pregnancy Program has been replicated by organizations in Tennessee and Louisiana.

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Footnotes

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