**January 2026**
*Volume 79*
*Number 1*

# South Dakota medicine

THE JOURNAL OF THE SOUTH DAKOTA STATE MEDICAL ASSOCIATION

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South Dakota medicine

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# DON'T GET INTO A "RUT" WITH ESTATE PLANNING!

## THREE STEPS FOR BETTER OUTCOMES.

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It's right up there with going to the dentist, renewing your driver's license, cleaning out your gutters, or trying to cancel your gym membership. Let's face it. Most adults don't exactly jump at the chance to update their estate planning documents, like their Will, Revocable Trust, or Power of Attorney. It's easy to understand why. After all, planning for incapacity or death can be difficult to think about, difficult to talk about with our loved ones, and all too easy to put off these uncomfortable discussions for a future date. But the longer you go without reviewing and revising your estate plan, the more likely your documents are to get outdated. And outdated documents could mean that your wishes and intentions of today may not be carried out in the event of your unexpected passing.

Here are three steps to avoid an estate planning "rut" for better outcomes that reflect your current intentions:

**1. Review –** Ideally, you would reread your estate documents every 1-2 years to make sure that you understand the gist of your plan: Who's in charge; who gets what; and how your heirs will receive their bequests. More frequent review is a great idea if you've experienced a major event in your life: (re) marriage, a birth or adoption in the family, receiving inheritance or other financial windfall, a new health diagnosis or illness, going through a separation or divorce, or a death in the family.

Working with an advisor can also help you stay on track with a regular estate plan review, and advisors can also alert you to recent income, estate, or gift tax law changes that may make updating your estate plan necessary to achieve your goals. Best case scenario, you review your documents and discover that they're still aligned with your wishes. More likely, you'll find something you may want to tweak, revise, remove, or replace. Knowing that you may want to make a change is half the battle.

**2. Update –** If your periodic or event-driven review has uncovered a provision in your Will, Trust, or Power of Attorney that no longer serves your needs and goals or there's a law change that makes an update advisable, then it's a matter of contacting your attorney. She or he will make the necessary changes and prepare new documents for signature. If you're working with a financial advisor, she or he can help you prepare for those meetings and talk through some options.

**3. Talk –** On the topic of talking through options, communicating your broad intentions, wishes, and decisions ahead of time is critically important to produce ideal outcomes, avoid hurt feelings, and prevent family conflicts. Both your heirs (children, grandchildren, family, friends) and your fiduciaries (Executor, Trustee, Power of Attorney Agent) need to hear what's in your heart directly from you. After all, a Will, Trust, or Power of Attorney document is a legal set of instructions, not a personal or sentimental writing. Don't leave these people in the dark! We suggest writing your loved ones a letter outlining your hopes, wishes, concerns, and lessons you've learned so that your words and spirit accompany your generous bequest.

When you commit to a regular cycle of Review, Update, Talk, you'll avoid the dreaded estate planning "rut," which will help ensure that your wishes are carried out and give your heirs and fiduciaries a better understanding of your intentions. Remember, you don't have to go it alone! Though your financial advisor at Foster Group can't help you with your dentist appointment, license renewal, or gutter cleaning, we're ready to help you start and stick to a consistent estate planning routine. Truly caring for you means taking the time to learn what's on your heart and to help you pursue your goals. Connect with us today to learn more.

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# When Excellence Masks Struggle: Recognizing the High-Achieving Learner in Distress

Jason J. Kemnitz, EdD

As a recovering undergraduate English major, I still appreciate unique axioms, and specifically how they have changes throughout the centuries. One favorite, originating in the early 1500s is: "as deep drinketh the goose as the gander" or nourishing opportunities exist for everyone. In my November article on struggling learners, I focused too narrowly on academically struggling students. But as the axiom states, the gander, our high-achieving learners, can struggle too.

Most faculty welcome high achievers into their clinics and classrooms. Unfortunately, assumptions like "these students won't need help" or "they'll figure things out" cause us to miss real struggles. High achievers often battle perfectionism and imposter syndrome, and without intervention, these behaviors persist throughout their careers. Identifying common patterns with specific solutions makes these learners stronger.

**The Perfectionist**

The perfectionist is a high-performing learner who often struggles with anxiety and a fear of uncertainty. They may spend excessive time on tasks, finding it difficult to delegate or trust others. Their harsh self-criticism can lead them to avoid challenging situations where failure is a possibility.

These learners thrive on structure but may need support in embracing ambiguity and developing self-compassion. Encouraging them to take small, calculated risks can help them grow and build resilience.

**The Imposter**

The imposter is a strong performer who attributes their success to luck rather than skill. They often live in fear of being "found out" and may struggle to accept praise or recognition. This mindset can lead to overworking as they try to compensate for perceived inadequacies.

Helping these learners build confidence in their abilities and encouraging open communication can reduce their fear of failure. Providing constructive feedback and celebrating their achievements can also foster a healthier self-perception.

**The Unchallenged**

The unchallenged high achiever coasts through tasks with minimal effort, often staying within their comfort zone. While they meet expectations, they may feel bored or disengaged, leaving their full potential untapped. This lack of challenge can hinder their long-term growth and satisfaction.

Encouraging these learners to take on more challenging tasks and explore new opportunities can reignite their motivation. Providing mentorship and setting higher expectations can help them stretch beyond their current limits.

**The Competitive or Superiority-Focused**

The competitive/superiority-focused learner is primarily concerned with rankings, grades, and accolades. They may create a toxic environment by putting down peers or focusing on "looking good" rather than genuine learning. This mindset can make teamwork and collaboration difficult.

Fostering a culture of collaboration and emphasizing the value of learning over competition can help these learners shift their focus. Encouraging teamwork and providing opportunities for peer recognition can also promote a healthier learning environment.

**The Burnout Risk**

The burnout risk is a previously high-performing learner who shows signs of declining engagement and exhaustion. They may experience cynicism, a loss of meaning in their work, or even early signs of substance use. Despite adequate rest, they often feel drained and disconnected.

Supporting these learners involves addressing the root causes of their burnout and helping them rediscover their sense of purpose. Encouraging self-care, providing resources for mental health, and creating a supportive environment can aid in their recovery.

It may be difficult to find ways to address these behaviors with students known to many as top performers. Starting

a conversation with a positive affirmation and offering to help ensure they continue to grow in the rotation or class is often a good way to begin. Much like when giving feedback (which is honestly what you're doing here), you also need to assess where the learner believes they stand. Questions like "What do you want to get out of this?" or "Are you feeling challenged?" are a good place to start. Finally, take the time to work with the learner to provide individualized goals that may go above and beyond the course or rotation's standard objectives. By doing this, you can help prevent the unique difficulties faced by high-achieving struggling learners.

We teach medical students that the sickest patients don't always look sick. The same applies to learners. The student with perfect shelf scores may be drowning beneath achievement's surface. Our diagnostic acumen must extend beyond the bedside to recognize distress disguised as excellence.

The old axiom reminds us that both goose and gander drink from the same well. We should stop assuming our high achievers are well-hydrated. In medicine, absence of symptoms doesn't mean absence of disease, the same holds for accomplished learners. Sometimes the best intervention isn't another challenge but permission to be human, to struggle, and to ask for help. That may be the most important lesson they carry into practice.

**About the Author:**
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Children's NEBRASKA

# Vaccinations in 2026

Ashley Sands, MD; and Keith Hansen, MD

Vaccination is one of medicine's most important discoveries and has reduced morbidity and mortality for untold numbers of people, especially vulnerable individuals including the newborn, fetus, elderly and the immunocompromised. One example of the success of vaccinations has been the eradication of smallpox (due to variola virus) in 1980 due to a global universal immunization campaign. Smallpox was a very deadly and disfiguring infectious disease, killing millions of people worldwide. Prior to the development of the smallpox vaccine, it was noted that people who survived an infection were more resistant or immune to a second infection. The first efforts in immunization, or in this case, variolation, were from people scratching material from a smallpox pustule into the skin of a previously uninfected individual, leading to a "mild" case of smallpox in the hope of inducing immunity to the dreaded disease. However, the virus did not always behave itself, resulting in a number of people dying from contracting the disease after exposure. Edward Jenner published his seminal work in 1758 on the use of cowpox immunization conferring immunity to smallpox. This publication launched the era of discovery of successful disease prevention through immunization.

Another example of a successful vaccination was the development of the rubella or German measles vaccine. German measles, while often a mild illness to a healthy adult or child, can be devastating to the developing fetus if a pregnant woman is infected. Congenital rubella infections can lead to miscarriage, stillbirth, and a constellation of birth defects including blindness, deafness, impaired growth, heart defects, inflammation and intellectual disability (congenital rubella syndrome). Prior to the introduction of the rubella vaccine in 1960s, there were large rubella epidemics in Europe and the U.S. From 1962 to 1965, there were an estimated 12.5 million infections resulting in over 11,000 miscarriages and stillbirths, 2,100 neonatal deaths, and 20,000 babies affected by congenital rubella syndrome in the U.S. The development of the rubella vaccine resulted in a significant drop in cases in the U.S., almost eliminating the disease. The CDC notes that since 2012 the only documented cases of rubella in the U.S. have resulted from infection when people have lived or traveled to areas of the world where the infection is still endemic. There are still many countries and regions of the world where rubella vaccination has not been sufficient to reach herd immunity.

Herd immunity results when a substantial number of individuals are immune to an infection either through having previously had the illness or through vaccination. Herd immunity decreases or halts the spread of an illness by making it difficult for an organism such as a virus to find a susceptible host. When members of a community are noted to be immune, the more vulnerable members of our community, including pregnant women and their babies, young infants, the elderly, and those who are immunocompromised, are thought to be protected from a particular infection. The number of immune individuals required to result in herd immunity is highly dependent on the contagiousness of the disease; a highly contagious disease like measles requires that over 93-95% of individuals are immune for herd immunity. Besides the need for a high number of individuals to be immune, herd immunity also needs homogenous interaction between people within the population. For example, many of our communities in South Dakota show more than 90% of schoolchildren have been vaccinated against measles, but within one school in a community, less than 50% of the children have been immunized. In this case, an individual infected with measles who goes to that school could very easily cause an outbreak in the school and their larger community. Other factors that impact herd immunity include mutations within the organism that were not covered by the vaccine, which we see with highly mutable influenza and COVID-19 viruses. Additionally, because immunity from vaccinations can wane over time, it is important for individuals to update their vaccinations according to the prescribed schedules.

In South Dakota, there has been a reduction in the number of individuals receiving vaccinations, including those needed to start school, many claiming religious exemptions. As a result, the number of individuals receiving the measles vaccine has consistently dropped below the level required for herd immunity. Some counties report vaccination rates well under 80% and multiple schools report that no kindergarteners have been vaccinated against measles. This opens the door for measles to get a foothold in the state, with its increased morbidity and mortality. Because rubella is part of the MMR vaccine, continued decreases in MMR vaccination rates

increase the risk of another outbreak of rubella in the U.S., which could lead to significant morbidity and mortality for a developing fetus. In a recent survey, most people noted that they rely on their physician to supply information about vaccinations. It is important that we continue to discuss the importance, efficacy, and safety of vaccinations with our patients not only to protect their health, but for the health of the most vulnerable among us.

In the last issue of *South Dakota Medicine*, Bruce Vogt, MD introduced our new Historical Series. In this issue, he wrote an article for the Historical Series titled "A Brief History of the Discovery of Vaccines and Vaccinations" which goes into more depth about this very important medical innovation. Over the coming months, the Historical Series will explore topics on the history of medicine, the medical innovations and some historical figures from South Dakota. I hope you enjoy this series of articles.

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HISTORICAL SERIES

# A Brief History of the Discovery of Vaccines and Vaccinations

H. Bruce Vogt, MD

The development of vaccines, which began in the late 18th century, have saved more lives than any other discovery in medicine. Edward Jenner, Louis Pasteur, and Robert Koch were key figures who made major discoveries in the field. Another researcher who greatly expanded the knowledge of specific vaccinations was Maurice Hilleman (1919-2005), a 20th century microbiologist who died relatively recently. So, who discovered what and when?

Edward Jenner was an English physician and scientist who created the first vaccine – smallpox.[1] For this discovery he is called the "father of immunology" although this is somewhat controversial as I will explain below. It was actually another English physician, John Fewster, who in 1768 postulated that a previous infection with cowpox made an individual immune to smallpox. It wasn't until 1796 that Jenner hypothesized that the pus in blisters of a patient with cowpox would protect one from developing smallpox. He tested his hypothesis by inoculating an 8-year-old boy with material from scraped blisters from the hands of a milkmaid who had contracted cowpox from a cow. The boy became mildly ill for about 10 days but then recovered. Two months later Jenner inoculated the boy with material from a "human" smallpox sore. The boy remained well and thus was the first human to be vaccinated against smallpox.[2]

At the time and for many centuries, "spontaneous generation," was the prevailing theory that living organisms could arise from nonliving matter. In 1861, the French Academy of Science sponsored a contest for the best experiment to prove or disprove this theory. Louis Pasteur a French chemist, pharmacologist, and microbiologist did a series of experiments and wrote a prize-winning essay in 1862 challenging the theory of "spontaneous generation." In his famous swan-neck flask experiment, Pasteur poured a nutrient rich broth into a flask and then boiled the broth. This killed any bacteria in the liquid. Although air could enter the flask, dust and germ particles were trapped in the long-curved neck of the flask. Hence, no living organisms appeared in the broth. He then tipped the flask on its side allowing dust and microbes to reach the broth. Bacteria appeared and multiplied. The same was true if the swan neck was broken. These experiments challenged "spontaneous generation" and argued that tiny germs (bacteria) carried in airborne dust were the cause of disease. This concept was termed "The Germ Theory of Disease" and the discovery was published by Pasteur in 1861.[3,4]

Pasteur studied rabies and had determined that the rabies virus resided in the brain and spinal cord. He then successfully tested a vaccine on dogs prepared from the dried spinal cord of a rabbit infected with the virus. Then in 1885, a French woman who was aware of Pasteur's experiments on rabies traveled with her 9-year-old son to Paris to see Pasteur and beg him to save her son. But, not only had Pasteur not tested the vaccine on humans, he wasn't a physician, and he was hesitant to try it. However, a physician associate of his, Dr. Jacques Joseph Grancher, convinced Pasteur to treat the Meister boy. Pasteur eventually agreed and enlisted Grancher to administer the vaccine. Grancher administered 13 doses (some sources say 12, some 14) of progressively more virulent vaccine. A month later, the young Meister remained well. This was considered a "milestone" and the beginning of the modern era of vaccination. Interestingly, Pasteur chose to stay silent about his success. Subsequently, Pasteur treated a 15-year-old boy, bitten by a rabid dog. Once again successful, this time Pasteur announced his success broadly and developed a rabies vaccination clinic attended by vast numbers.[5] The clinic became a research and teaching center, the Institut Pasteur, opening three years later.[6]

Credit with regard to immunology is controversial. As noted above, Jenner is generally considered the "father of immunology"[1] and also the "father of vaccination" both in honor of his discovery of smallpox vaccination. However, some credit the designation of "father of immunology" to Pasteur due to his broader contributions. It is also acknowledged that, despite his preminent discovery, Jenner's research did not lead to an understanding of how immunity works. The title of "father of vaccines" is typically reserved for Pasteur. He discovered that vaccines can be made from attenuated microbes and developed the earliest vaccination

against fowl cholera (the first lab-produced vaccine) and for anthrax. A significant difference in Jenner and Pasteur's approach to vaccines and vaccination is that Pasteur, unlike Jenner, used the infectious agents themselves to achieve immunization.[7]

Robert Koch, a German physician and microbiologist made consequential contributions to microbiology including identification of the causative agents for tuberculosis, anthrax and cholera. Based on his research, he developed what became known as Koch's Postulates to establish that a particular germ causes a particular disease. The first of four postulates states that the suspect bacteria "must be present in every case of a disease and must not be present in a healthy organism" (wording varies by source). Koch was the first to identify specific microorganisms as the etiology of specific diseases. This further established the "Germ Theory of Disease" and laid the foundation for modern bacteriology. Koch, in fact, is recognized as the "founder and father" of modern bacteriology. At the very least, he is recognized as having solidified the "Germ Theory of Disease" if not to being considered the co-founder of this discovery. In 1905, Koch received the Nobel Prize for Physiology or Medicine for his work regarding tuberculosis.[8]

A researcher not well known to many, but having a great impact on the science of vaccination was Dr. Maurice Hilleman. He and his team developed over 40 vaccines many routinely recommended in American vaccination schedules. These include: rubeola, rubella, mumps, hepatitis A and hepatitis B, Neisseria meningitidis, streptococcal pneumonia, and Hemophilus Influenza. For his numerous discoveries Hilleman is considered the "father of *modern* vaccines."[9]

By reducing disease rates and controlling the spread of infections, vaccinations have saved millions of lives. Their discovery by the researchers briefly discussed above and others, is without question one of the cornerstones of medicine.

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# State of South Dakota's Child: 2025

Ann L. Wilson, PhD; Tyler A. Hemmingson, MPH; and Brad Randall, MD

*The year 2026 has arrived and I greet you with this report that describes the first year of life for South Dakaota's youngest residents. Each year we learn about the changing compostion of the state's annual cohort of newborns who are increasingly reflecting greater diversity in their heritage. The state's recent birth rate also exceeds that of the nation. The challenge we face is understanding and responding to the dynamics these data reflect. Our care must effectively reach all the state's citizens to assure healthy beginnings for South Dakota's babies and their future – upon which the state will continue to flourish.*

*I extend to you and your families my warmest best wishes for the new year.*

*Tim Ridgway, MD, MACP, FASGE*
*Dean, University of South Dakota Sanford School of Medicine*
*Vice President for Health Affairs*

**Abstract**

In 2024, there was an increase from the previous year in the number of births in South Dakota with 11,434 new babies joining the state's population. Among this birth cohort, 71% were White, 12% American Indian, 9% Hispanic, 3% Black, and 5% other races. Over recent years, a declining percent of this annual cohort is White or American Indian with other racial groups increasingly contributing to the births in the state. South Dakota's 2023 birth and fertility rates were the highest of the nation. These state rates also showed that compared to all other races, Whites also had the lowest rates of fertility in South Dakota. The state's infant mortality rate (IMR) is increased in 2024 (7.35) from the previous year (5.36) with increases in both the neonatal and post neonatal rates that occrred in only the White/Hispanic population. Five-year (2020-24) data, however, show that 71% of births are White yet they contribute to 51% of infant deaths; dissimilar to American Indians who compirse 13% of births yet contribute to 30% of all infant deaths. Almost a quarter (23%) of all infant deaths in the state are caused by sudden unexpected infant death (SUID) with a rate that is statistically significantly higher ($p<.01$) than what is observed nationally. Further, data show that the state's rate of SUID is not decreasing and there also has been an increasing percent of these deaths having potentially preventable risks associated with them. Overall, the state's 2020-24 total IMR (7.03) and post neonatal mortality rate (2.03) were signficanlty higher ($p<.01$) than the 2023 rates (5.6; 1.96) for the nation.

## Introduction

This annual review of births and infant deaths in South Dakota provides a glimpse of the newest residents of the state and describes the sad reality that not all babies survive their first year of life. This year's report provides more specific details on the racial background of the infants described. In these previous reports, data on the "White" and "Hispanic" populations have been combined consistent with how, until recently, state data also have been presented. When possible, in this report, data from these two racial groups will be separated and disaggregated data from other racial groups will also be presented. In graphs of longitudinal trends and those that represent small sample sizes, data will continue to be presented with White and Hispanic groups combined as White/Hispanic and compared to those from a combined group of American Indian, Black and Other (AIBO) populations. The "Other" population includes mixed races and Asians. Interpretations of the relatively small numbers of births and infant deaths in the state, which consequently yield year to year fluctuations in rates, require caution as they are described and this report is responsive to this reality.

### Natality

In 2024, 11,434 newborns became residents of South Dakota. Figure 1 shows that this was a 2.9% increase (294 newborns) from 2023, but also is a 7.2% decrease in births in the state since its last peak in 2015.[1]

The recent trend of declining births in the state parallels observations made nationwide; however, the state's rates of births and fertility exceed those noted nationally. This can be seen in Figure 2 that compares South Dakota's rate of birth (per 1,000 population) with that of the nation. This finding is amplified with final national 2023 data showing that South Dakota's birth rate (12.2) exceeds that of all other states in the nation.[2] This is also true of the state's fertility rate (births per 1,000 females 15-44 years of age) which was 65.6 compared to 54.5 for the country as a whole.[2] The data that are equally compelling in distinguishing the state's current national status related to annual births are those that describe its "replacement" or total fertility rate, representing the level at which a given generation can exactly replace itself, which is 2,100 births per 1,000 women (or 2.1).[3] Since 2007, the nation's replacement rate has been consistently below "replacement" and was 1.62 in 2023. Again, South Dakota's 2023 replacement rate of 2.0 was the highest among all states and comes close to reflecting what is considered as necessary to replace its current population.[2]

Total birth and fertility rates show trends per population and the pie charts in Figure 3 illustrate these findings with data showing how the racial composition of births in the state has changed between 2009 and 2024. Over these 15 years, the diversity of the state's birth cohorts has increased with decreases in its proportion of White (75 to 71%) and American Indian births (15 to 12%) with concomitant increases in the percent of newborns who are Hispanic (4 to 9%), Black ( 2 to 3%) and of Other racial groups (4 to 5%). Even with this increasing diversity, the 2024 cohort of South Dakota newborns is considerably more homogeneous than what is noted nation-wide where half of all newborns are White and half represent all other racial backgrounds.[1-2]

Racial differences in the state's fertility rates add another perspective to birth rates as demographics of its emerging

**Figure 1.**

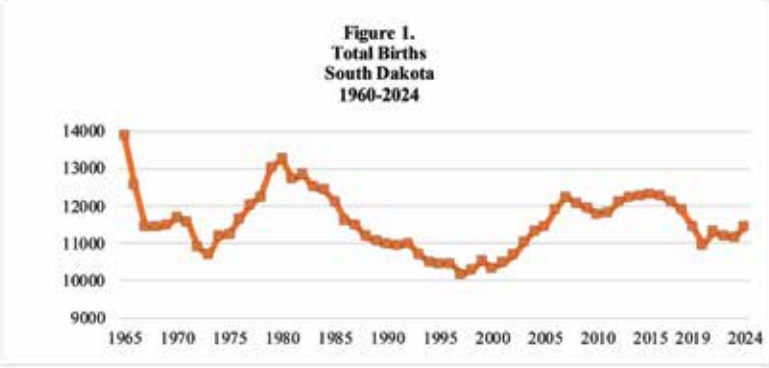



**Figure 2.**

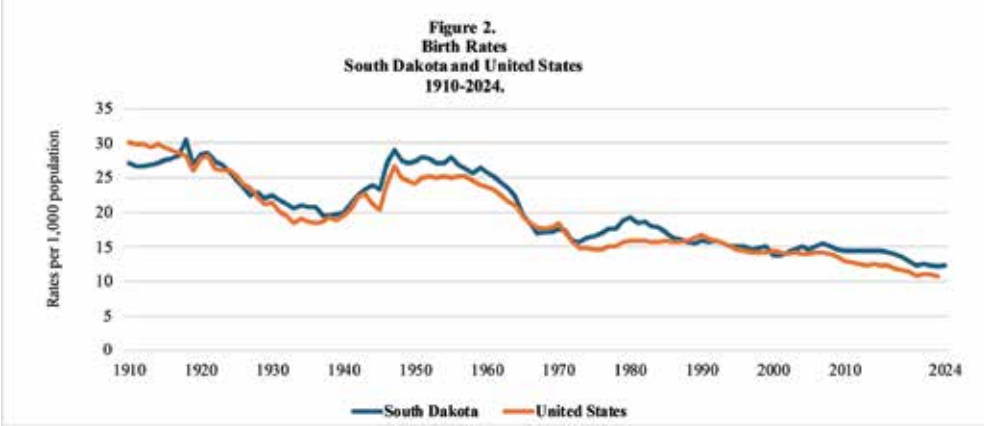
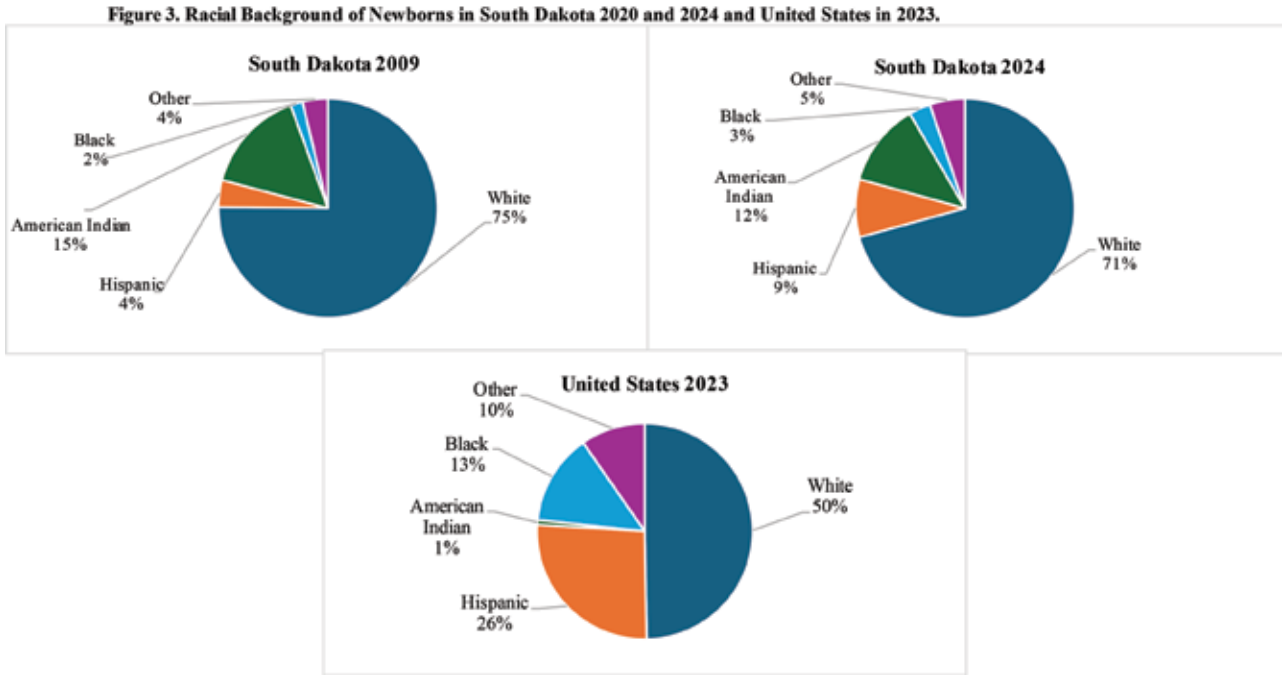


Figure 3.




population are examined. Figure 4 presents data that compare the 2024 rates for the state with those in 2023 for the nation and reveal striking differences by race. Total fertility is again noted in this figure to be higher for the entire state compared to the country (66.6 vs 54.4) but greater differences are apparent when rates are disaggregated by racial groups. Compared to South Dakota, the nation's fertility rates are 16% lower for Whites, 46% lower for American Indians, 31% lower for Hispanics and 29% lower for Blacks. Striking differences are also noted between races within the state. The fertility rates for Whites are 34% lower than those of Hispanics and 30% lower than those of American Indians. For both the state (93.3) and the nation (64.7), the highest fertility rates are for Hispanics.[1-2]

Birth weight is an important parameter as perinatal health of cohorts of newborns are examined. Figure 5 provides data that compare seven decades of birth weights less than 2500 grams of the state and nation's newborns. Very apparent in

Figure 4.

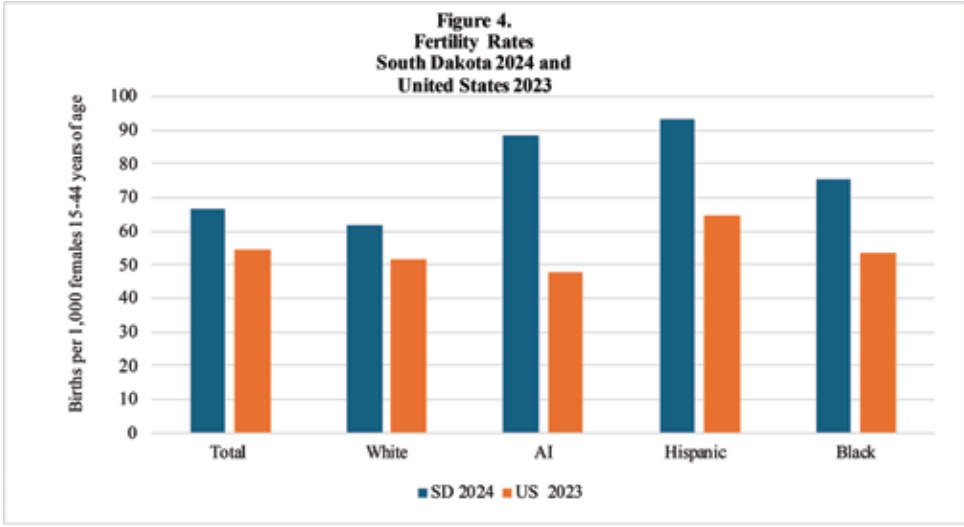
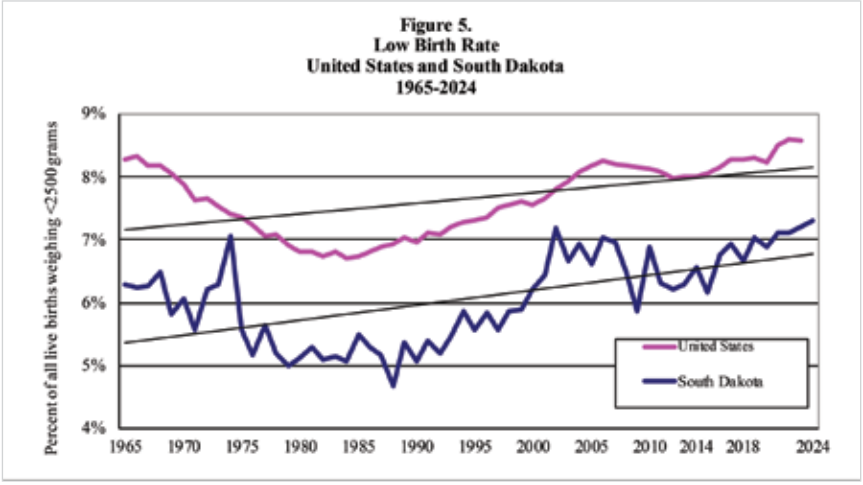


Figure 5.

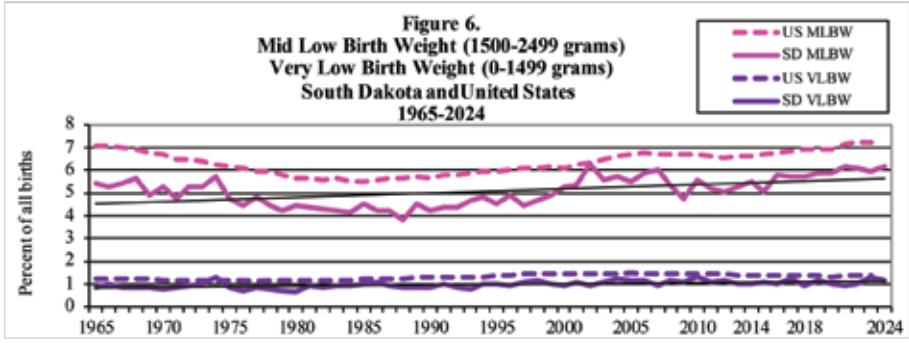



this figure is how South Dakota's percent of low birth weight (LBW=<2500g) newborns has consistently been lower than that observed nationally yet parallels US trends. In 2024, the percent of LBW among its newborns was 7.3% and slightly higher than what was observed the previous year (7.2%). Nonetheless, this rate is 15% lower than the U.S. rate (8.6%) in 2023.[1-2] Presented in this figure and ones that follow are trend lines that serve to smooth short-term fluctuations, highlighting the general direction of the data over time.

To further explore LBW, Figure 6 breaks this parameter down to identify its sub-groups of very low birth weight (VLBW=<1500g) and mid low birth weight (MLBW= 1500 to 2499g). This figure shows the relative stability over time in rates of both national and state VLBW, (approximately 1% of all births) yet South Dakota has typically had a slightly lower percent of these births among its annual cohort of newborns than noted nation-wide and also had a very minor decrease in them in 2024 from the previous year (1.3 to 1.1%). For MLBW newborns, a different trend is apparent. There has been an increasing percent of these births both nationally and in the state. Again, South Dakota has consistently had a lower percent of MLBW than the US though it experienced a slight 2024 up-tick (6.2 from 5.9%) in them from the previous year.[1-2]

Important to observe are year to year fluctuations in the state's number of births of less than 500 gram newborns as they have a high rate of mortality. In 2024, there were 22 births in this weight category and they contributed to 17% of VLBW cohort compared to nine babies (6% of VLBW) in 2023. These observations will be further explored as mortality data are reviewed. [1]

Figure 6.



To add to an understanding of birth weight, Figure 7 provides disaggregated data by race to provide a helpful perspective. This figure shows apparent racial discrepancies for birth weight. Whites and Hispanics have essentially similar percents of their newborns with VLBW and MLBW (1% and 6%) and American Indians, Blacks and Other racial group have higher rates of LBW newborns. Blacks have the highest percent of their newborns in the state with VLBW (2%) and MLBW (8%).[1]

Strategies for improving perinatal outcomes highlight the preventive value of prenatal care and seek to optimize its utilization. Racial disparities in utilization of first trimester prenatal care in the state during the pre and post-pandemic (2019-2024) years are observed in Figure 8. Consistently over these years, 83% of White women have received prenatal care in the first trimester meeting the 80.5% Healthy People Goal for 2030 but this is true for only 60% of Hispanic, 55% for Black and 41% of American Indian women.[1,4] Further, Figure 8 shows downward trends in utilization of first trimester care for Hispanics, Blacks and American Indian pregnant women. South Dakota data from 2018-2022 dramatically show a relationship between prenatal care and mortality in the first year of life.[5] Infants whose mothers had no or care only in the third trimester of pregnancy had a rate of death in the first year that was almost three times higher than that of infants whose mothers had first trimester care.

### Infant Mortality

Infant mortality rates (IMR) are expressed as deaths of infants less than 365 days of age per 1,000 live births. Figure 9 shows how compared to the entire county, South Dakota's IMR is more variable, which reflects its relatively small number of annual births upon which this rate is calculated. Figure 9 shows an uptick in the state's 2024 IMR that increased to 7.35 from 6.36 in 2023. This increase reflects 13 more infant deaths in 2024 (84) than occurred in 2023 (71). Further since 2006, the state's IMR has consistently been higher than that observed nation-wide that was 5.6 in 2023.[1,6]

Rates of death during infancy are differentiated by when they occur during the first year of life. The neonatal mortality rate (NMR) refers to deaths that occur during the first 27 days of life per 1,000 live births, while the post neonatal mortality

Figure 7.

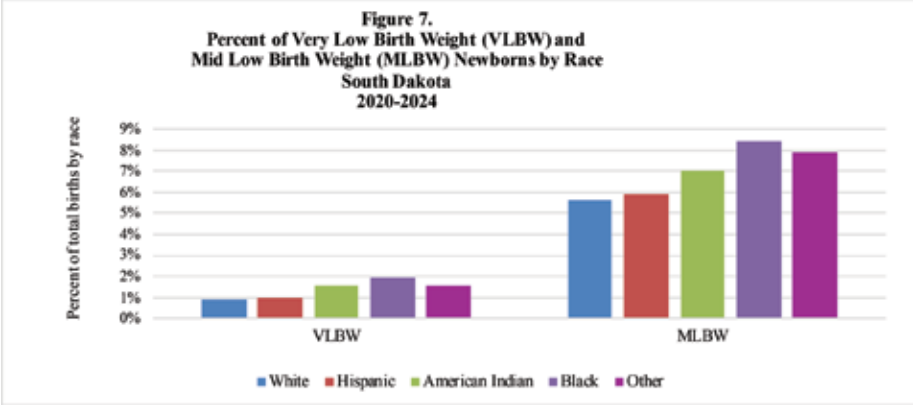



Figure 8.

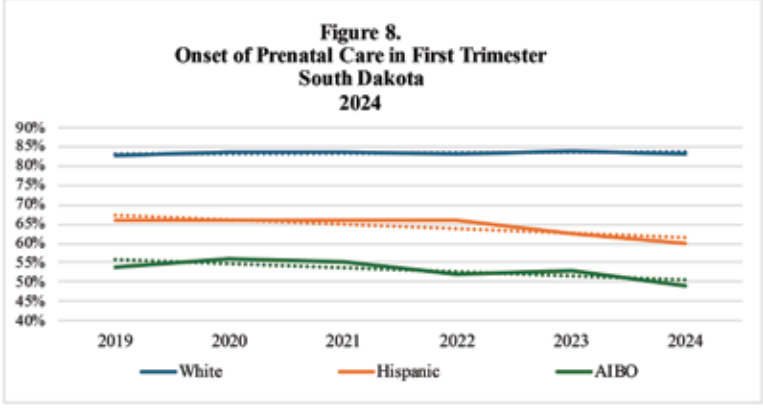
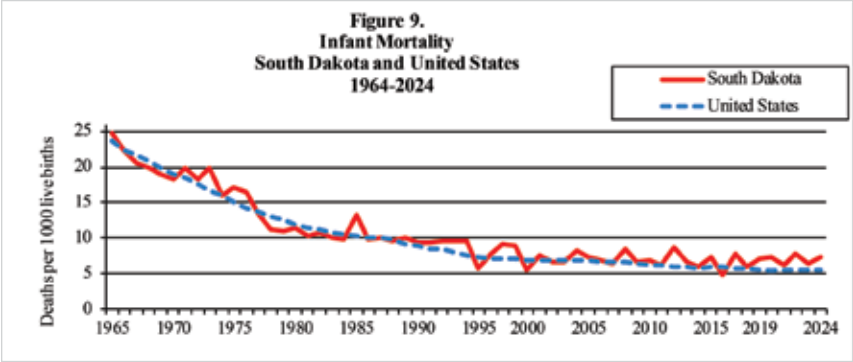


Figure 9.




rate (PNMR) refers to deaths between 28 and 364 days of life. The data in Figure 10 show how NMR is higher than PNMR for both the state and nation. For South Dakota, in 2024, both the NMR and PNMR increased from the previous year and exceeded these rates for the country as a whole.[1]

In 2024, 51 newborns died in the neonatal period yielding a rate of 4.5 compared to its rate the previous year of 3.9 and is the highest number of these deaths since 2017. As noted earlier, in 2024 there were 22 newborns with birth weights of less than 500 grams and 91% of them did not survive. Overall, 39% of the neonatal deaths in 2024 (20/51) were of these extremely VLBW newborns and is also a number similar to what was also observed in 2017. The state's post neonatal mortality rate in 2024 also increased in 2024 to 2.9 from its previous 2023 rate of 2.4.[1]

Figure 11 compares the IMR for the state's White/Hispanic and AIBO populations. Notably, Figure 10 shows that both the NMR and PNMR increased between 2023 and 2024

Figure 10.

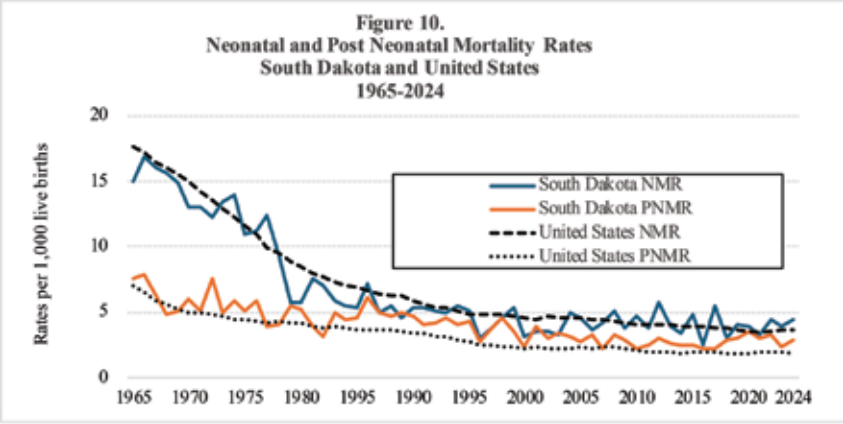



Figure 11.

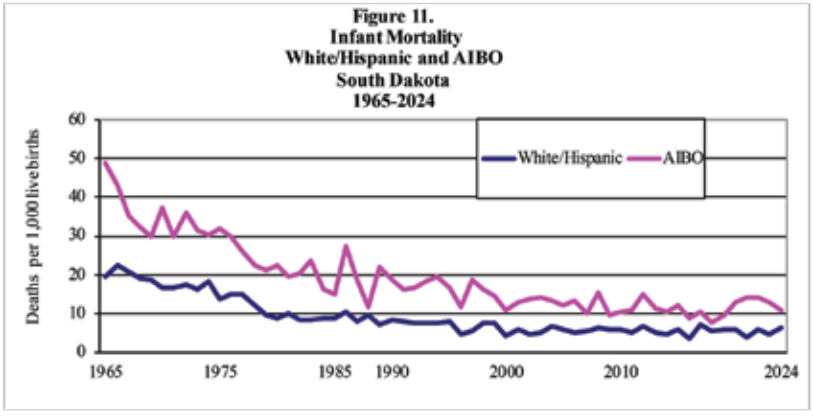
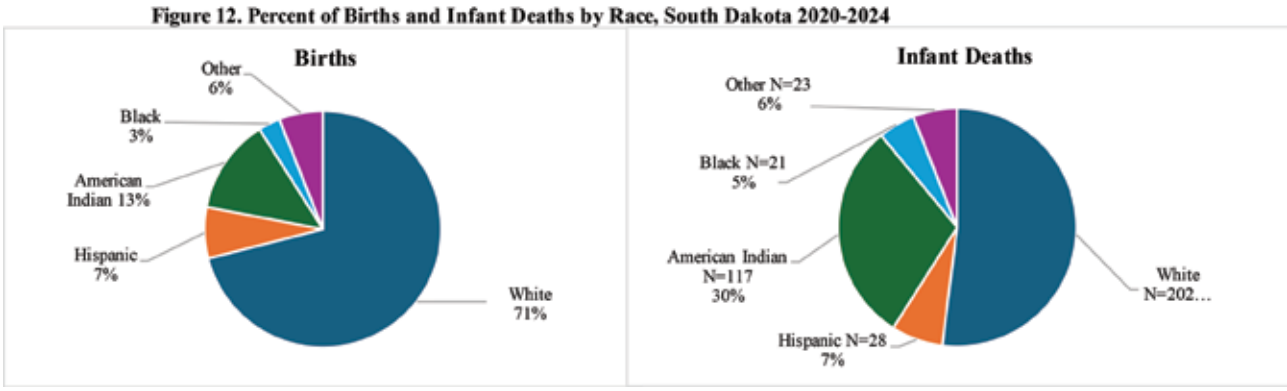


Figure 12.




with Figure 11 showing that these increases only occurred for White/Hispanics infants. More specifically, between 2023 and 2024, there was an increase in the White/Hispanic NMR (3.3 to 4.1) and PNMR (1.3 to 2.1) while decreases were observed in the NMR (6.0 to 5.5) and PNMR (6.8 to 5.5) for the AIBO population.[1]

Figure 12 presents the disaggregated data for the past five years (2020-24) on the distribution of births and infant deaths for the state's White, Hispanic, American Indian, Black and Other populations. Specifically, in this figure, actual numbers of deaths are also presented for each racial group with their percent of the total group of infant deaths noted in the Figure 12 pie chart. Data in this figure show that over these past five years, Whites have constituted 71% of births but only 52% of the infant deaths. Hispanics and Others contributed approximately equally to all births and infant deaths (7 and 6% respectively). American Indians contribution to the state's infant deaths is over twice their percent of all births in state. Specifically, 30% of infant deaths are American Indian, yet they comprise only 13% of all of the state's births. Only 3% of all of the state's births are Black and they make up almost twice this percent (5%) of all infant deaths during these past five years.[1]

Figure 13 allows another perspective on infant mortality in the state by comparing five-year mean (2020-24) neonatal and post neonatal mortality rates by racial cohort. With the exception of the Other population, the NMR exceeds the PNMR. Notably, American Indians have the highest mortality in both the neonatal and post neonatal periods of the first year of life. Though this population contributed to 13% of all births, 28 % of all neonatal deaths and 34% of all post neonatal deaths in the state were American Indian.[1]

Table 1 adds to the descriptive data presented in the figures to show statistically significant differences in five-year (2020-24) mean rates of neonatal, post neonatal and total infant mortality. These analyses show that the NMR, PNMR, and total IMR is significantly higher ($p<.01$) for the state's AIBO population than these rates for its White/Hispanic

Figure 13.

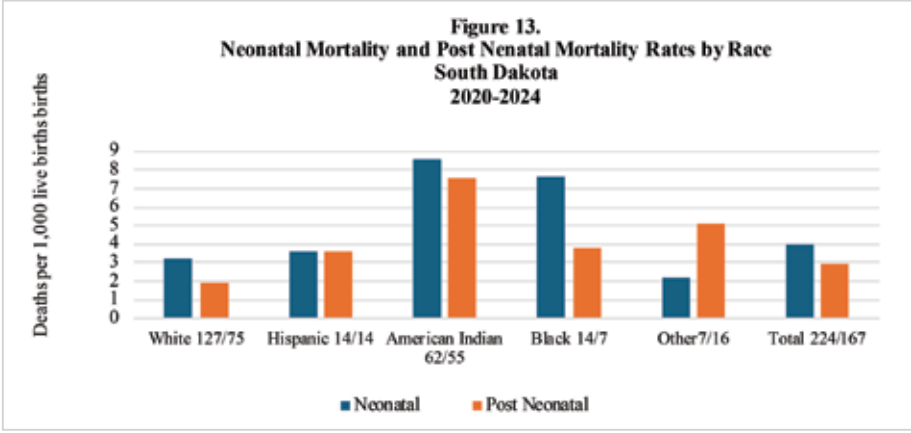


Table 1.

| | Rates Per 1,000 Live Births | | | | | | |
|---|---|---|---|---|---|---|---|
| | South Dakota 2024 | South Dakota 2020-2024 | | | Total Population | | |
| Cause of death | Total population | White/Hispanic | AIBO | P White vs. AIBO | SD 2020-2024 | US 2023 | P SD vs. US |
| Neonatal mortality rate | 4.46 | 3.23 | 6.79 | <.01 | 4.01 | 3.65 | NS |
| Post neonatal Mortality rate | 2.89 | 2.04 | 6.38 | <01 | 3.02 | 1.96 | <.01 |
| Infant mortality | 7.35 | 5.27 | 13.18 | <01 | 7.03 | 5.60 | <.01 |

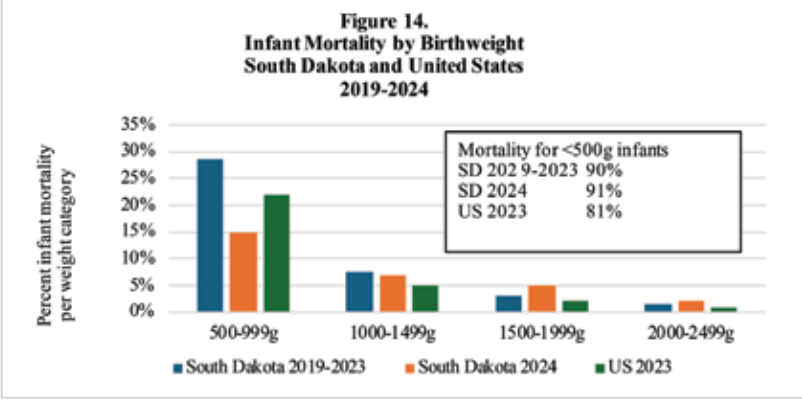
South Dakota data from SD Department of Health, US data from CDC[8]

population. When state data for its entire population are compared to the most recent 2023 US data, the state's rate of PNMR and total IMR are significantly (p<.01) higher while its NMR is not statistically different from that observed nationally. Additionally, though the state's NMR, PNMR and IMR for its total population increased in 2024 from the previous year, these 2024 mortality data are not statistically significantly higher than those for their previous five-year (2019-2023) means.

Figure 14 provides data that compare mortality for the state's LBW cohorts of infants in 2024 with the previous five-year (2019-2023) mean. The 2024 data show that with the exception of the 500 to 999 gram cohort, mortality for each of the LBW cohorts was similar in 2024 to the previous five-year mean mortality for infants. Also noted in Figure 14 is how South Dakota's mortality in each LBW cohort is slightly higher than that noted nationally in 2023.[1,7]

Birth weight specific mortality provides a measure that contributes to an analysis of infant mortality. Over the last five years (2020-24), over half (56%) of all infant deaths in

Figure 14.



South Dakota were LBW and 36% were VLBW. Figure 15 breaks down LBW mortality by race for the state and provides the numbers of deaths for each of the racial groups. With the exception of infant deaths for the Other racial category, Whites had the lowest mortality in both the VLBW and MLBW cohorts. Birth weight specific mortality was highest for American Indians in both LBW groups.[1]

Data on causes of infant death add more specificity to understanding why infants die during the first year of life. Figure 16 compares the 2020-24 distribution of neonatal deaths by causes for South Dakota's White/Hispanic and AIBO populations. Overall, the distributions appear quite similar; however, as noted in Table 1, the total rates of neonatal mortality for these two groups are statistically different with the rate for AIBO infants significantly higher ($p<.01$) than that for White/Hispanic infants. A slightly higher percent of all AIBO than White/Hispanic neonatal deaths are attributed to perinatal causes (68 vs 61%) and this finding is consistent with data presented in Figure 15 showing their higher mortality for LBW infants. A higher percent of AIBO than White/Hispanic infants die from other causes (5% vs 1%) that include infections and malignancies.[1]

Figure 17 compares the distribution of causes of post neonatal deaths for the state's White/Hispanic and AIBO populations. Similar to neonatal causes of death, the distribution of causes of death for these two groups appears quite similar. The biggest difference is in SUID deaths, with this cause contributing to 51% of White/Hispanic deaths and 44% of AIBO deaths. SUID is the leading cause of death for both groups during the post neonatal period of life. Similar to the observations during the neonatal period of life (Figure 16) in post neonatal period, other causes of death contribute to a larger percent of AIBO than White/Hispanic (28 vs 22%) infant deaths. As these data showing the distribution of post neonatal deaths are examined, important to recognize are the data in Table 1 showing that the total PNMR is statistically significantly higher ($p<.01$) for the AIBO than for the White/Hispanic population of infants.[1]

While pie charts in Figures 16-17 enable a view of how White/Hispanic and AIBO infants deaths are distributed by cause for 2020-24, Figure 18 allows an examination of how rates of death by cause have changed for the total population of infants in the state between 2007 and 2024. These data show that for "other" causes, and accidents/homicides there

**Figure 15.**

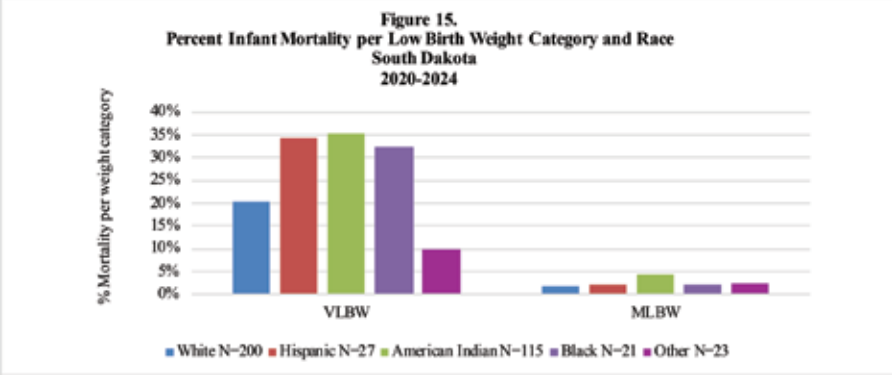



**Figure 16.**

**Figure 16. Causes of Neonatal Death for the White/Hispanic and American Indian, Black and Other (AIBO) Populations in South Dakota 2020-2024**

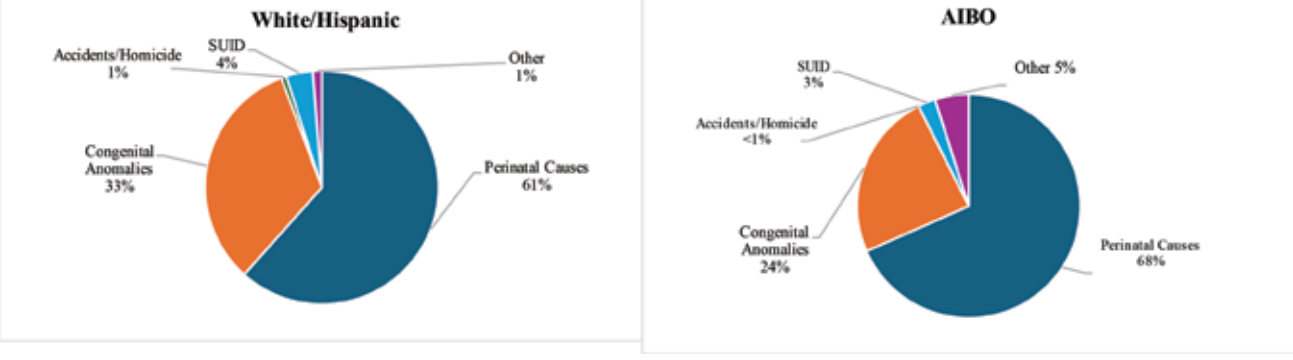


Figure 17.

Figure 17. Causes of post neonatal death for White/Hispanic and American Indian, Black and Other (AIBO) Populations in South Dakota 2020-2024

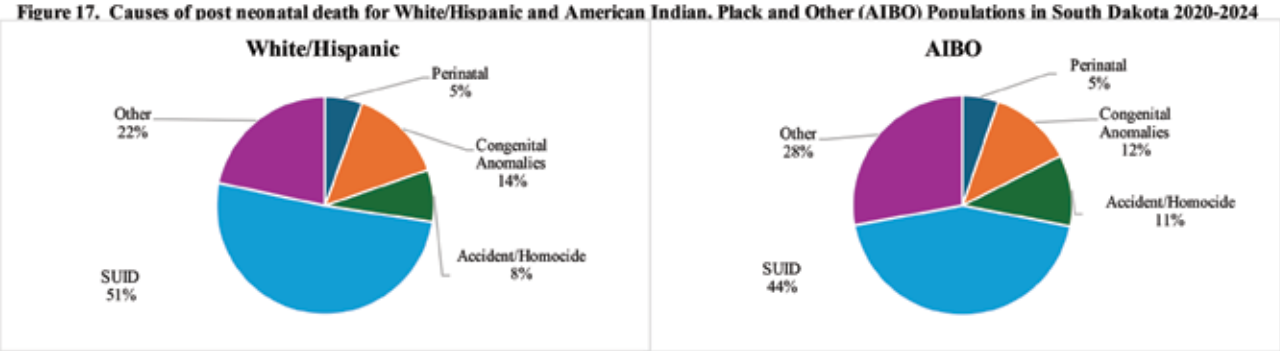
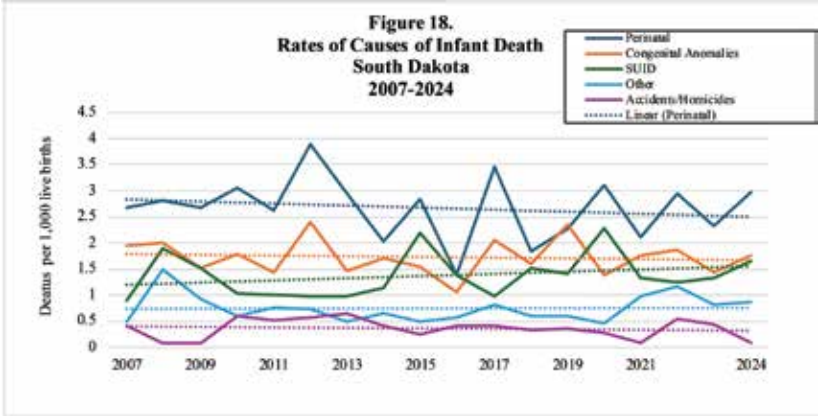



Figure 18.




has been little change. Alternately, rates of death due to perinatal causes and congenital anomalies have decreased over these years.[1] SUID is a term used for three sub-groups of unexpected infant deaths that occur during sleep. These subgroups are sudden infant death (SIDS=R95) that is used to certify deaths for which no risk factors are identified, accidental suffocation and strangulation in bed (ASSB=W75) and unknown (R99). Noted in Figure 18 is that SUID is the only cause of infant death for which the trendline shows an increase in its rate over these 17 years.

The data points in Figure 18, specific for 2024, show that this year's increase in its IMR can be attributed to an increase in deaths due to perinatal causes (probably related to the relatively higher number of less than 500 gram newborns), congenital anomalies, and SUID. The apparent decrease in rate of deaths due to accidents/homicides is impressive and in 2024 was among the lowest observed since 2007.

Table 2 provides five-year mean data (2020-2024) that compare White/Hispanic and AIBO mortality for causes of infant death and compares the state's IMR rates by cause with those for the most recent available data from the nation. AIBO rates of infant death for perinatal causes, congenital anomalies, SUID and other causes are significantly ($p<.01$) higher than for the state's White/Hispanic population. Rates of infant deaths due to accidents and homicides are not significantly different. Compared to national rates of infant mortality by cause, the state as a whole has significantly ($p<.01$) higher rates of death due to congenital anomalies, SUID and other causes. Compared to national rates, South Dakota's mortality for infants due to perinatal causes and accidents/homicide are not significantly different.[1,8]

SUID deaths have been followed in this annual report with special interest as they are a major contributor to rate of infant death and are increasingly recognized as often having risk factors associated with them that could be attenuated with safe sleep practices for infants. Currently, approximately one in four of all infant deaths (23%) in South Dakota are attributed to SUID. Figure 19 presents data with five-year moving averages that show how deaths certified as caused

Table 2.

| | Rates Per 1,000 Live Births* | | | | | | |
|---|---|---|---|---|---|---|---|
| | South Dakota Infant Mortality Rate | | | | Total Population | | |
| | 2024 | 2020-2024 | | | | | |
| Causes of death | Total Population | White /Hispanic | AIBO | P White/Hispanic vs. AIBO | SD 2020-2024 | U.S 2023 | P SD vs. US |
| Perinatal causes | 2.97 | 2.05 | 4.91 | <.01 | 2.69 | 2.75 | NS |
| Congenital Anomalies | 1.75 | 1.37 | 2.34 | <.01 | 1.62 | 1.11 | <.01 |
| Sudden unexpected death | 1.66 | 1.17 | 3.03 | <.01 | 1.57 | 0.99 | <.01 |
| Accidents and homicides | 0.09 | 0.18 | 0.65 | NA | 0.29 | 0.18 | NS |
| Other* | 0.87 | 0.48 | 2.05 | <.01 | 0.86 | 0.57 | <.01 |

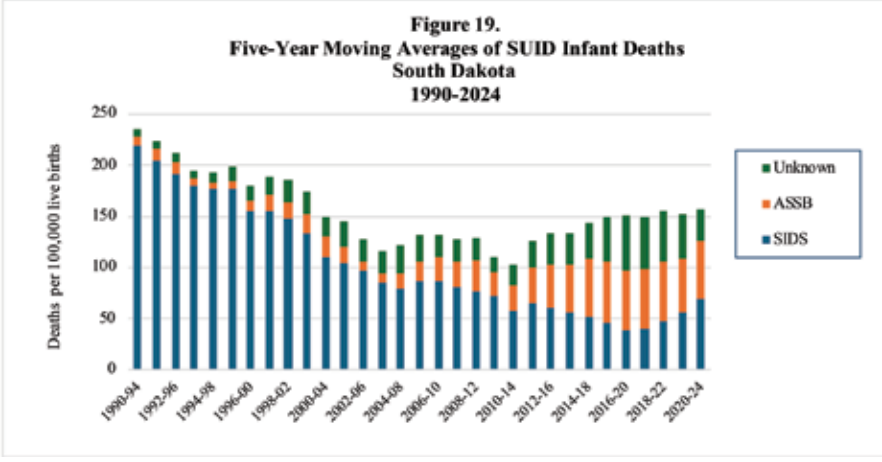
All South Dakota data are from South Dakota Department of Health, US data from CDC REF 8
* Other – Medical conditions such as infections, malignancies etc.
P values <.05 are considered significant

by one of the three sub-groups comprising SUID have shifted over time with fewer currently attributed to SIDS and more identified as caused by ASSB. This change likely reflects enhanced death scene investigations and increasing awareness of how hazards in the sleep environment are associated with infant death. Further, the data in Figure 19 show that progress in decreasing SUID rates of death has stalled in the state over the past decade with these rates actually increasing in recent years from what was observed earlier this century.[1]

## Discussion

As annual birth and infant death data are explored trends become apparent and observations are made of findings that are unique to a given year. Overall, a story is revealed about life beginning in South Dakota yet sadly ending for some babies during the first year of life. This report has attempted to examine with greater specificity, than in the past, racial differences in perinatal outcome. To do this, five-year means are presented to accommodate the state's small population.

Figure 19.



Data that provide trends over time continue to combine racial groups so that continuity with previous reports that have compared state data with those from the nation can be achieved.

Leaders in the United States and other nations are currently expressing concern regarding diminishment of annual births. This observation has far-reaching economic impacts for the future when likely higher percentages of elder citizens will be dependent on the shrinking base of a tax-paying population. Pronatalist policies that encourage more births arouse a diversity of perspectives regarding efforts to promote them.

South Dakota has the distinction in 2023 of having the nation's highest birth and fertility rates in the country and is close to achieving the rate of "replacement" (2.1) that is needed to maintain its population. Further, the state has an increasing diversity in its annual cohorts of births. Currently 71% of all newborns are White and there is an increasing percentage of Hispanic, Black and newborns from other racial backgrounds contributing to the annual cohort of newborns. In addition, the fertility rates for these groups exceed those for Whites. With this observation, there is a need to recognize that women who are not White have been less likely to receive first trimester prenatal care. Concomitantly, state data present the stark reality that babies are more likely to die if their mothers received no or late prenatal care during their pregnancies. With the recent closure of some rural hospitals, "maternity deserts" have been created. There is reason for concern about how new emerging increased travel distances may affect pregnant women's access to perinatal care. What are other barriers to prenatal care? Logistic challenges, limited child care, economic hardships, educational limitations, chaotic lives, and fears may limit its utilization.

As long as mortality data for infants have been collected, there has been a recognition that death early in life is not equitable and is related to financial resources or race. In South Dakota, 13% of the state's births between 2020 and 2024 were American Indian, yet 30% of all infant deaths were among babies of the state's native heritage. Further, American Indians have a higher percent of VLBW than Whites (1.6 vs 1%) and 35% of these babies die before the first year of life compared to 20% for the White population. What do these findings reveal in a state where access to tertiary neonatal intensive care exists with active transport systems bringing newborns and pregnant women to needed intensive care? Further, what do these findings indicate about the vulnerability of these babies or other environmental conditions affecting their survival? Perinatal causes of death are significantly higher (<.01) for the AIBO cohort of babies than for Whites and Hispanics. This is also true of deaths due to congenital anomalies, SUID and other causes.

A sobering observation that continues to be made is the persistent rate of SUIDs that has not diminished for at least the past decade and currently is the cause of death of nearly a quarter (23%) of all infant deaths in the state. What has occurred, with an increase in death scene investigations, has been a shift in how these deaths are codified. More SUID deaths in the state than in the past are being identified as occurring in sleep environments that include preventable hazards. Overall, if South Dakota's rate of SUID in 2024 was equal to the rate for the nation in 2023, the state would have experienced 11 SUIDs rather than the 19 babies who died of this cause. This alone would have brought the state's 2024 IMR down from 7.3 to 6.6, which is still higher than the US 2023 IMR of 5.6. Further, in South Dakota, 58% of all SUIDS in the past five years (2020-24) have come from the 71% of the population that is White/Hispanic with 42% from all other races (AIBO) that comprise 29% of the population.

The year 2025 has included the curtailment of many federally funded services that impact maternal and child health. Among these is the discontinuation of the NIH Safe to Sleep campaign that provided national education on safe sleep practices for infants. The American Academy of Pediatrics calls this action "devastating" and points out that it occurred when there was a national 12% increase in SUIDs between 2020-22 attributable to decreases in education for new parents during the pandemic.[9] Local efforts are now needed, more than ever, to increase educational efforts on safe sleep and other health related topics for new parents when federal support for services and national leadership is increasingly limited.

In South Dakota, the state's birth rate is higher for babies who are not described at birth by their mothers as White. Yet, more of these babies are likely than White babies to have mothers who did not receive early prenatal care, to be low birth weight and more likely to die if LBW than White babies. Further, overall rates of death during the neonatal and post neonatal periods of time are higher for those babies who are not White. These data point to the reality that if the state's IMR is to decrease, the racial disparities in perinatal health care and outcomes need to be diminished.

Not to be underestimated is the complexity of dynamics

that underpin infant mortality. Sexual behavior, genetics, health care received, cultural values, personal resources, environmental hazards, and individual parental traits are but a few of the variables at play as infants are conceived, gestated, delivered and cared for during the first year of life. Interactions between these variables impact what happens to a baby during the first 364 days of life in which the likelihood of death is higher than it will be for many decades. The fragility of life as it begins is undebatable, as must be the value of efforts of parents, their health care providers, and communities to protect its well-being – a well-being that also impacts the future of our society.

**Key Points**

The total number of live births in South Dakota increased between 2023 and 2024 but remains 7% below the state's last peak number of births in 2015.

In 2023, the state's birth rate (births per 1,000 population), fertility rate (births per 1,000 females 15-44 years of age), and replacement (the level at which a given generation can exactly replace itself) was the highest of any state in the nation.

South Dakota's fertility rates for its American Indian, Hispanic, and Black populations are higher than those for its White population and its total is higher than that of the nation.

South Dakota's total cohort of newborns is increasingly racially diverse with its Hispanic, Black and Other populations increasing in their contribution to total births. In 2024, 71% of births were White representing a 4% decrease in the past 15 years. Nationally, in 2023, 50% of all births were White.

South Dakota's percent of very low birth weight (<1500g) and mid low birth weight (1500-2499 g) newborns has been consistently lower than observed nationally.

VLBW and MLBW is higher for the state's American Indian, Black and Other populations of newborns than for its White and Hispanic newborns. The highest percent of VLBW and MLBW newborns are among Black newborns.

Over the past 6 years (2019-2024), approximately 80% of all White pregnant women have received care in the first trimester. Trends show a declining percent (40 to 60%) of pregnant women of other racial groups receiving this first trimester care.

In 2024, infant mortality increased to 7.4 deaths per 1,000 live births from 6.4 in 2023. The increase occurred in both the neonatal mortality rate (NMR=deaths of infants less than 28 days of age) and post neonatal mortality rate (PNMR=deaths between 28 and 364 days of age) and were only observed in the White/Hispanic population.

When five-year (2020-2024) data on NMR and PNMR are examined, they show that they have been highest for American Indian infants with the percent mortality for VLBW infants higher for Hispanic, American Indian and Black infants than White or infants of Other racial backgrounds.

Compared to 2023, IMR data for the United States, South Dakota's mean NMR for 2020-24 is not significantly different. The state's PNMR is significantly higher (P<.01) than what was observed nation-wide in 2023.

South Dakota's mortality rates for causes of infant death show that for its White/Hispanic populations it is significantly (p<.01) lower for perinatal causes, congenital anomalies, SUID and other causes than it is for its combined American Indian, Black and Other (AIBO) racial group.

Sudden unexpected infant death (SUID) is the leading cause of post neonatal deaths (51% for White/Hispanics and 44% for the AIBO population). Over the past 10 years little progress has been made in decreasing the rate of these deaths though more of them are now associated with preventable risks observed in the sleep environment.

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# Family Functioning in a Space Without Barriers: An Observation Study of Caregiver Behavior Among Children with Complex Needs

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**Abstract**

Parents of children with complex medical needs face a set of stressors unique in comparison to parents of children with routine care. Prior literature has shown that parents of children with complex medical needs experience significant stress and physiologic burnout in daily life. While completing a week of service at a vacation location for families with children with complex medical needs, a group of medical students from the University of South Dakota Sanford School of Medicine conducted a purely observational study. This study explored intrafamilial and interfamilial parental interactions, with a focus on observed mood, stress levels, engagement with children, and routine structure. All observations were recorded anonymously in real-time on digital forms, which were then organized into a de-identified data set. The results revealed a significant negative association between observed mood and stress level, as well as a significant positive association between level of routine structure and engagement with their child with complex medical needs. This observational study explores emotional states, engagement, and behaviors of parents with children with complex medical needs in a specially supportive environment. Although causality and generalizability are limited in this research, the data suggest that providing more accessible and supportive settings for families with children with complex medical needs could impact intrafamilial relationships.

## Introduction

Nearly 20 third-year medical students from the University of South Dakota Sanford School of Medicine participated in a week of service at a vacation location for children with complex medical needs (CCMN) and their families. This location is accessible exclusively through partnerships with wish-granting organizations that sponsor eligible children and their families for a cost-free, weeklong vacation. In order to qualify, children must be between the ages of 3 and 18 and have been diagnosed by a licensed medical professional with a life threatening or terminal illness. Only families meeting these criteria were used for inclusion in the observational aspect of this study.

During a week of service at this vacation location, students conducted an observational study exploring the interactions of parents of CCMN with their partners, CCMN, and/or other family members.

Prior research has shown that parents of CCMN are often faced with significant caregiver stress, resulting in suboptimal mental health.[1] Participants in these studies cited financial distress, overseeing the medical care and appointments for their CCMN, adapting their living space to be more accessible, and neglect of social relationships outside of the family as sources of mental strain.[2] The literature emphasizes an integral link between parents' mental health to family wellbeing. Additionally, research shows that having routine and structure within the family likely leads to improvement in mental health and individual fulfillment.[1]

Medical students from USD SSOM considered these points while crafting the observational study. Highlights of the study focus on the evaluation of parental stress levels and engagement with their CCMN/other children, as well as the level of structure evidenced in their interactions. The setting of this study, the vacation location intentionally designed to accommodate CCMN and their families, offers a unique opportunity to examine the impact of external circumstances on parental engagement and stress. This study aims to provide a new perspective on the relationship between supportive, accessible environments and caregiver behaviors.

## Methods

This observational study was conducted by third-year medical students from the University of South Dakota Sanford

School of Medicine during a one-week service project at a vacation location for children with complex medical needs and families accessed through wish-granting organizations. The setting aimed to provide respite and enjoyment for families experiencing ongoing medical challenges.

Medical students served as non-participant observers and did not interact directly with the families regarding this project. Each student was expected to document observations during their volunteer shifts, though no minimum number of entries was required. In total, 160 observations were recorded. Students often worked in pairs or small groups during their assigned shifts, and it is likely that more than one student independently observed and recorded the same family interaction. Prior to the trip, all participating students engaged in a literature review exploring caregiver stress, family dynamics, and coping strategies in parents with children with complex medical needs. They then collaborated in the development of the structured observational tool. This process allowed them to align on key domains of interest and gain shared understanding of the behaviors they would be observing. The tool was designed to standardize data collection and minimize subjectivity by focusing on observable, externally evident behaviors and affect without requiring verbal communication or consent.

Key domains observed included:

- Interaction partners (e.g., child with medical complexity, spouse, siblings, volunteers)
- Apparent parental mood and stress indicators
- Level of engagement with the child
- Observed caregiving or recreational activities
- Parental responses to child distress or medical needs
- Coping strategies (e.g., physical comfort, verbal reassurance, distraction)
- Communication style regarding the child's medical needs
- Perceived structure or flexibility in caregiving routines

All data were recorded using digital forms and compiled into a de-identified dataset. Because the project involved no direct contact, intervention, or collection of identifiable information, it qualified as exempt from Institutional Review Board (IRB) review under ethical standards for non-interventional educational research.

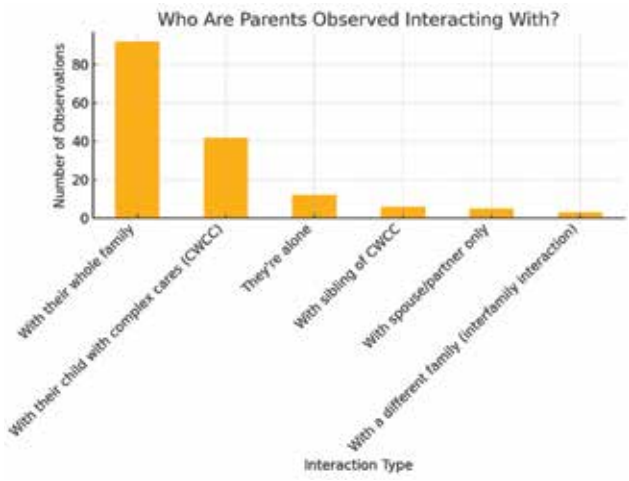
## Results

A total of 160 observational entries were collected during the one-week volunteer period at a wish-granting resort for CCMN. Observations captured visible parental behaviors, engagement patterns, and coping strategies in a supportive, recreational setting.

### Parental Interaction and Engagement

Parents were most frequently observed interacting with their child with medical complexity (CWCC), comprising 58.1% of all observations. Other contexts included whole-family interactions (19.4%) and instances in which the parent was alone (13.1%) (Figure 1). Parental engagement was rated as "highly engaged" in 52.5% of cases and "somewhat engaged" in 34.4%. Only 1.9% were categorized as "non-engaged," while others were left blank or marked as unsure. Activities shared between parents and children include eating (38.8%), playing (21.9%), resting (13.1%), caregiving (9.4%), and watching entertainment (8.1%).

**Figure 1. Frequency of observed interactions: most parents were seen engaging with their CWCC, followed by whole-family interactions.**




### Mood and Stress Indicators

Observed mood was described as:

- Happy/Positive: 44.4%
- Fair: 38.1%
- Concerned or Poor: 14.4%
- Unreported: 3.1%

Visible signs of stress were absent in 47.5%, occasional in 35.6%, and frequent in 11.9% of observations (Figure 2). Coping strategies employed by visibly stressed parents included:

- Avoidance (22.5%)
- Deep breathing (12.5%)
- Seeking social support (10.6%)

In moments of child distress or need, parents were observed to provide:

- Verbal reassurance (35.6%)
- Physical touch (30.0%)
- Distraction (22.5%)

**Figure 2. Pie chart showing the distribution of visible stress signs among parents.**

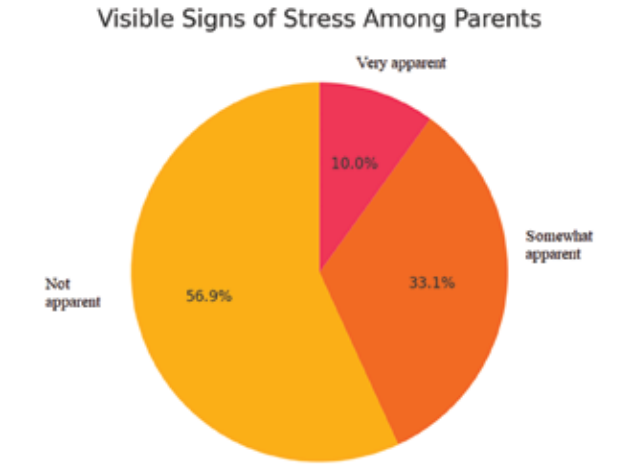
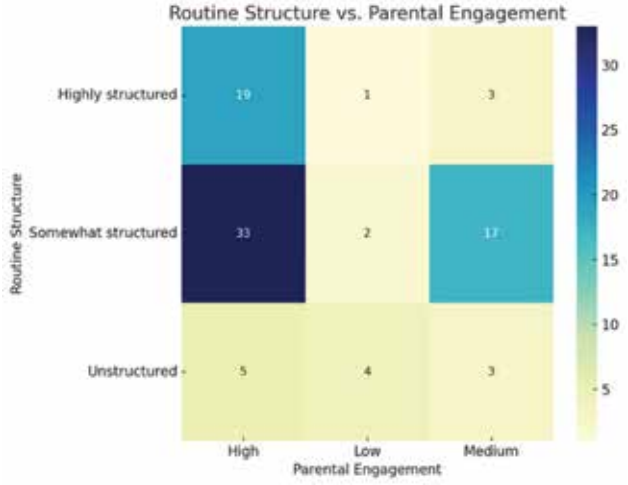



**Figure 3. Heatmap showing the association between caregiving routine structure and observe engagement levels ($x^2$=15.51.11, p<0.004).**




- Proximity without intervention (15.6%)
- Help-seeking behavior (10.6%)

### Caregiving Structure and Communication

Caregiving routes were rated as:

- Highly structured: 40.6%
- Somewhat structured: 23.1%
- Unstructured: 10%
- Unclear or not reported: 26.3%

Parents most commonly communicated their child's medical needs through direct verbal communication or brief explanations.

### Statistical Associations

Chi-square analysis revealed a significant relationship between parental mood and visible stress ($x^2$=57.11, p<0.001). Parents with a "happy/positive" affect were substantially less likely to show signs of stress, while those with "poor" or "concerned" moods were more likely to exhibit frequent stress.

Another significant association was found between structure in caregiving routines and parental engagement. ($x^2$=15.51.11, p<0.004). Highly structured routines were more often observed in parents rated as highly engaged (Figure 3). No significant association was observed between engagement and visible stress (p=0.15), though trends suggested that more engaged parents may show fewer stress indicators.

### Discussion

This observational study offers insight into the behaviors, affective states, and caregiving approaches of parents of CCMN within a uniquely supportive environment. While existing literature has extensively documented the psychological burnout experienced by caregivers of CCMN, including elevated levels of stress, depression, and social isolation,[1-3] our findings suggest that in a setting specifically designed to reduce logistical and emotional strain, parents may demonstrate greater engagement and emotional regulation.

In contrast to studies conducted in clinical or home care contexts, where parents frequently report fatigue, care coordination stress, and diminished quality of life,[1,2] over 50% of parents in this study were described as highly engaged, with nearly half showing no signs of stress. These results support the hypothesis that environmental context plays a significant role in shaping observable caregiver behaviors. As noted in prior qualitative work, the ability to participate in normalized family routines without systemic barriers can significantly reduce caregiver burden and improve perceived well-being.[4]

A statistically significant association was observed between the presence of a structured caregiving routine and higher levels of parental engagement. This finding aligns with literature that emphasizes the stabilizing effects of predictability and routines in families managing chronic medical conditions.[1,5] Structured care routines may empower caregivers by promoting a sense of control and competence, factors known to buffer against caregiver stress. Similarly, we found that positive mood was significantly associated with the absence of visible stress, reinforcing established connections between affect regulation and caregiver functioning.[6]

It is essential to consider the influence of the setting where

these observations were conducted. The vacation-style resort was designed to accommodate the needs of families with CCMN, allowing for full accessibility, inclusive programming, and medical support services. This environment removed many common caregiving stressors such as transportation challenges, social isolation, and constant medical vigilance. In this space, families had the opportunity to experience daily life in a more typical manner, and parents could more often say "yes" to their children, whether that meant joining in play, exploring new experiences, or simply resting together. These conditions likely contributed to the elevated rates of observed positive affect and engagement.

Despite the strength of real-time, structured observations in a naturalistic environment, several limitations should be acknowledged. The observational design does not permit assessment of internal emotional states or long-term impacts. Additionally, the lack of demographic and diagnostic data precluded subgroup analysis, and variability in observer perception may have influenced interpretations of mood and stress, though the use of a structured observational tool aimed to reduce this bias. Finally, the setting itself, while essential to the study design, limits generalizability to everyday clinical or home environments.

The data collection tool consisted of a standardized form completed daily by students based on observed interactions. This tool was developed by the student research team prior to the trip, informed by a literature review, which facilitated a shared understanding of target behaviors for observation. The tool's content validity was supported through the literature review and pre-trip meetings in which the research team collaboratively reviewed and refined both the tool and the associated expectations. However, no additional validation procedures were conducted.

These findings raise important questions about how health systems can incorporate supportive, family-centered features into routine care. While vacation environments are not replicable in everyday practice, aspects such as adaptive infrastructure, normalized family routines, and opportunities for respite could inform models of holistic care delivery. Future research should explore how structural support mechanisms, such as coordinated respite care, routine-building interventions, and inclusive design, can be scaled and sustained outside of specialty resort settings.

## Conclusion

This observational study provides insight into the behaviors, emotional states, and caregiving dynamics of parents of CCMN in a specialized vacation-focused setting. Existing literature consistently documents high levels of caregiver stress and associated mental health challenges in this population.[1,2] Our findings indicate in an environment designed to alleviate external stressors, many parents display positive affect and high engagement with their children. These observations support prior evidence suggesting environmental modification and relief from day-to-day caregiving burdens can significantly influence parental well-being and family functioning. The significant association between structured caregiving routines and increased parental engagement aligns with previous findings indicating that routine and predictability contribute to emotional regulation and perceived competence among caregivers of CCMN.[1]

While our study did not establish causality, it raises important questions about the role of caregiving structure in shaping both parental and child outcomes in families managing medical complexity. This study highlights the value of specialized family-centered environments for parents of CCMN. In an environment designed to alleviate the burden of complex care, CCMN and their families are allowed greater freedom to participate and explore a range of activities that would otherwise be difficult or impossible for them in a non-specialized setting. By alleviating external medical stressors this environment facilitated strengthening of the parent-child relationship.

Future research could explore how elements of these supportive settings could be integrated into everyday or routine medical care across a variety of settings. Understanding and improving upon the integrated specialized support demonstrated in this setting and its impact on intrafamilial relationships will likely be a point of emphasis in future holistic care with positive impacts both for the patient directly and their caretakers.

## REFERENCES

1. Bayer ND, Wang H, Yu JA, Kuo DZ, Halterman JS, Li Y. A national mental health profile of parents of children with medical complexity. Pediatrics. 2021;148(2):e2020023358.

*Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at ereiss@sdsma.org for a complete listing.*

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# Hyperlipidemia Management: Comprehensive Review and Looking Forward

Whitnee Otto, MD; Muhammad Hasan, MBBS; and Maria Stys, MD

**Abstract**

Hyperlipidemia is a major risk factor of atherosclerotic cardiovascular disease and remains a major global health concern. While statins remain the cornerstone of therapy, a subset of patients require additional interventions due to inadequate response, intolerance or more stringent LDL goals. Recent advancements in understanding lipid metabolism and cardiovascular risk have led the medical community to emphasize on personalized, patient-centered approaches. This review article explores those recent advancements in lipid metabolism research that have led to adjunctive agents such as PCSK9 inhibitors, ezetimibe, bempedoic acid, and inclisiran, which have demonstrated significant efficacy in lowering low-density lipoprotein cholesterol (LDL-C) and improving cardiovascular outcomes.

## Introduction

Hyperlipidemia is a primary risk factor for atherosclerotic cardiovascular disease (ASCVD), which remains a leading cause of morbidity and mortality worldwide. Traditionally managed with lifestyle modifications and statins, hyperlipidemia treatment has evolved significantly in recent years. With recent advancements in understanding lipid metabolism and cardiovascular risk, the medical community now recognizes the need for personalized, patient-centered approaches that may include nonstatin therapies. This review highlights recent guidelines and emerging therapies, illustrating a comprehensive strategy for effectively managing hyperlipidemia and reducing ASCVD risk.

## Pathophysiology and Risk Factors

The pathophysiology of hyperlipidemia centers on lipid metabolism disturbances, particularly involving low-density lipoprotein cholesterol (LDL-C), which can accumulate in arterial walls and initiate atherosclerosis. LDL particles attract macrophages when oxidized, forming foam cells that contribute to plaque buildup. Over time, these plaques may rupture, leading to thrombus formation and increasing the risk of acute coronary events. Risk factors for hyperlipidemia include both genetic and lifestyle elements. Familial hypercholesterolemia is a genetic disorder that increases LDL and significantly heightens cardiovascular risk. Modifiable risk factors including diet, obesity, and sedentary behavior, all contribute to dyslipidemia. Comorbidities such as hypertension, diabetes, and metabolic syndrome further increase ASCVD risk. Understanding these risk factors is critical, as they not only inform treatment decisions but also highlight the importance of lifestyle interventions in managing lipid levels and reducing overall cardiovascular risk.

## Traditional Therapy

Statins are the cornerstone of hyperlipidemia treatment, particularly for lowering LDL levels, the primary target in cardiovascular risk reduction. Statins inhibit HMG-CoA reductase, an enzyme in hepatic cholesterol synthesis. This inhibition leads to upregulation of LDL receptors on liver cells, increasing LDL clearance from the bloodstream. Statins vary in their potency and ability to reduce LDL levels. High-intensity statins, such as atorvastatin and rosuvastatin, generally achieve substantial LDL reductions of 50% or more. In contrast, moderate-intensity statins reduce LDL levels by approximately 30% to 49%, while low-intensity statins offer more modest reductions, typically lowering LDL by less than 30% (Table 1).[1]

Statins have demonstrated robust efficacy in primary and secondary prevention of ASCVD events. Studies like the Cholesterol Treatment Trialists' meta-analyses have shown that each 1 mmol/L (equivalent to 38.67 mg/dL) reduction in LDL-C through statin therapy corresponds to a 22% reduction in major vascular events.[2] Statin therapy for primary prevention was linked to a 17% reduction in all-cause mortality, a 15% decrease in cardiovascular mortality, and a 34% lower risk of myocardial infarction in women.[3]

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some limitations exist. Statin intolerance, often due to myopathy or myalgia, affects a subset of patients, leading to discontinuation or dose adjustments. Statin intolerance has been reported in 5-30% of patients with the lowest noted in clinical trials and highest seen in observational studies. Approximately 60% of adults report muscle symptoms as the primary reason for discontinuing the medication.[4,5] The highest incidence of myalgias were observed with simvastatin 40 mg (50%), while the lowest rates were seen with fluvastatin XL 80 mg (8%) and rosuvastatin 10 mg (10.8%).[6] Although rare, serious adverse effects, such as rhabdomyolysis were observed in 4 per 10,000 cases.[7] Additionally, high-risk groups including patients with multiple major ASCVD events or one major ASCVD event and multiple high-risk conditions. may not achieve sufficient LDL reductions with statins alone, requiring adjunctive nonstatin therapies. Given these limitations, recent guidelines emphasize tailoring statin therapy intensity based on individual risk, while also considering nonstatin therapies for patients with high ASCVD risk or statin intolerance.

**2018 Multi Societal Guidelines & 2022 ACC Expert Consensus Pathway:**

The multi-societal guidelines and 2022 ACC expert consensus for hyperlipidemia management emphasizes a personalized approach to lipid management that integrates both clinical risk factors and individual preferences.

The guidelines recommend that for individuals less than 20 years of age, lifestyle modifications are emphasized to prevent ASCVD, with statins recommended for those diagnosed with familial hypercholesterolemia. For ages 20–39, lifetime risk estimation is used to encourage lifestyle changes, with statin consideration if there is a family history of premature ASCVD and LDL-C levels ≥160 mg/dL. For adults aged 40–75 with LDL-C levels below 190 mg/dL and without diabetes, 10-year ASCVD risk should be calculated. Moreover, for adult patients with LDL-C greater than 190, high intensity statin is indicated. Patients with diabetes age 40–75 are advised to take moderate-intensity statins, with consideration for high-intensity statins based on individual risk assessments (Table 2).

ASCVD risk levels can be classified as low (<5%), borderline (5–7.5%), intermediate (7.5–20%), and high (≥20%) using ASCVD risk calculators which take age, sex, race, blood pressure, lipid levels, smoking and history of diabetes into account. Recommendations for statin therapy vary by risk level, ranging from lifestyle emphasis to initiation of moderate- or high-intensity statins. Special considerations are provided for those with additional risk factors, such as a family history of ASCVD, chronic kidney disease, inflammatory conditions, and for those with elevated biomarkers. If decision-making remains unclear, coronary artery calcium (CAC) scoring can help guide therapy decisions, with CAC score >0 favoring statin initiation (Table 3).[8]

Adults on maximally tolerated statin therapy are categorized into two groups based on their future ASCVD risk: very high risk and not at very high risk. Patients classified as very high risk include those with a history of multiple major ASCVD events, such as myocardial infarction (MI), ischemic stroke, symptomatic peripheral artery disease, or a recent acute coronary syndrome (ACS) within the past 12 months. Additionally, patients with a single major ASCVD event and multiple high-risk conditions—such as age >65, heterozygous familial hypercholesterolemia, a history of coronary artery bypass grafting (CABG) or percutaneous

**Table 1. Statin therapy.**

| High intensity | Moderate intensity | Low intensity |
|---|---|---|
| Atorvastatin 40–80 mg | Atorvastatin 10–20 mg | Simvastatin 10 mg |
| Rosuvastatin 20–40 mg | Rosuvastatin 5–10 mg | Pravastatin 10–20 mg |
| | Simvastatin 20–40 mg | Lovastatin 20 mg |
| | Pravastatin 40–80 mg | Fluvastatin 20–40 mg |
| | Pitavastatin 1–4 mg | |
| | Fluvastatin 40 mg BID | |
| | Lovastatin 40–80 mg | |

**Table 2. Statin recommendations by age.**

| Age group | Guideline recommendations |
|---|---|
| **<20 years** | Lifestyle modifications emphasized to prevent ASCVD. Statins recommended for individuals with familial hypercholesterolemia. |
| **20–39 years** | Statins considered if family history of premature ASCVD and LDL-C ≥160 mg/dL. |
| **40–75 years** (LDL-C <190 mg/dL, not diabetic) | 10-year ASCVD risk assessments should guide therapy decisions. |
| **40–75 years & diabetic** | Moderate-intensity statins recommended. Consider high-intensity statins based on individual risk factors. |
| **Any age** (LDL-C >190) | High intensity statin recommended |

**Table 3. ASCVD risk classification.**

| ASCVD risk level | Risk percentage | Statin therapy recommendations |
|---|---|---|
| Low risk | <5% | Lifestyle modifications recommended. |
| Borderline risk | 5–7.5% | Consider moderate-intensity statins if additional risk enhancers are present. |
| Intermediate risk | 7.5–20% | Moderate-intensity statins recommended. High-intensity statins may be considered if multiple risk enhancers exist. |
| High risk | ≥20% | High-intensity statins recommended. |
| Special considerations | N/A | Additional risk enhancers (e.g., family history of ASCVD, CKD, inflammatory conditions, elevated biomarkers) may guide therapy.<br>CAC scoring: If uncertain, a CAC score >0 favors statin initiation. |

**Table 4. LDL-C management in maximally tolerated statin.**

| Risk category | Criteria | LDL-C goal | Treatment strategy |
|---|---|---|---|
| very high risk | - History of multiple major ASCVD events(MI, ischemic stroke, symptomatic PAD, or recent ACS within past 12 months)<br>OR<br>- One major ASCVD event + multiple high-risk conditions (Age >65, FH, CABG/PCI, diabetes, HTN, CKD, smoking, CHF) | <55 mg/dL<br>≥50% reduction | 1st Line: High-intensity statin<br>2nd Line: ezetimibe and/or PCSK9 mAb<br>3rd Line: bempedoic acid or inclisiran |
| Not at very high risk | - ASCVD present but does not meet criteria for very high risk | <70 mg/dL<br>≥50% reduction | 1st Line: high-intensity statin<br>2nd Line: ezetimibe<br>3rd Line: PCSK9 mAb<br>4th Line: bempedoic acid or inclisiran |

coronary intervention (PCI), diabetes, hypertension, chronic kidney disease (CKD), smoking, or a history of congestive heart failure (CHF)—also fall into this category. For these patients, a ≥50% reduction in LDL-C and a target LDL-C level of <55 mg/dL is recommended. If this goal is not met, ezetimibe and/or a PCSK9 monoclonal antibody (mAb) should be added. For those who remain above the target despite second-line therapies, bempedoic acid or inclisiran may be considered.

For patients not at very high risk, a ≥50% LDL-C reduction with a target LDL-C level of <70 mg/dL is recommended. If this goal is not achieved, ezetimibe is the preferred second-line therapy. If further intensification is needed, PCSK9 mAbs serve as third-line therapy, while bempedoic acid or inclisiran are considered fourth-line options (Table 4).[9]

### Nonstatin Therapies

Nonstatin therapies have gained importance in hyperlipidemia management, especially for patients unable to reach LDL-C targets with statins alone or those intolerant to statins. These therapies primarily include PCSK9 inhibitors, ezetimibe, bempedoic acid, and, more recently, inclisiran. Each offers a unique mechanism for lowering LDL-C and, when combined with statins, provides additional risk reduction for ASCVD.

#### PCSK9 Inhibitors

- Mechanism: PCSK9 inhibitors (e.g., alirocumab, evolocumab) are monoclonal antibodies that target PCSK9, a protein that degrades LDL receptors on liver cells. By inhibiting PCSK9, these drugs increase LDL receptors' availability, enhancing LDL clearance from the blood.
- Efficacy: PCSK9 inhibitors can lower LDL-C by an additional 50-60% when added to statin therapy, making them valuable for patients at very high risk or those with familial hypercholesterolemia. Clinical trials like the FOURIER and ODYSSEY Outcomes studies have shown that these drugs reduce cardiovascular events in high-risk patients.[10,11]
- Challenges: High costs and the need for injections every 2-4 weeks have limited widespread use, though recent price reductions may improve accessibility.

#### Ezetimibe

- Mechanism: Ezetimibe works by inhibiting cholesterol absorption in the small intestine, reducing the amount of cholesterol delivered to the liver and thus decreasing blood cholesterol levels.
- Efficacy: Alone, ezetimibe lowers LDL-C by about 15-20%; combined with statins, it enhances LDL-C reduction, helping patients reach target levels. The IMPROVE-IT trial demonstrated that ezetimibe combined with statins could reduce cardiovascular events in high-risk ASCVD patients.[12]
- Role in therapy: It is often considered the first-line

adjuvant therapy for patients who cannot achieve desired LDL-C levels on statins alone, especially due to its oral administration and minimal side effects.

**Bempedoic Acid**

- Mechanism: Bempedoic acid inhibits ATP-citrate lyase, an enzyme upstream in the cholesterol synthesis pathway, which reduces LDL-C production. Activated only in the liver and not in muscles, bempedoic acid poses a lower risk of muscle-related side effects, making it suitable for patients with statin-associated muscle symptoms.
- Efficacy: Studies indicate that bempedoic acid lowers LDL-C by 15-20% when used alone and up to 38% when combined with ezetimibe. Per the CLEAR Outcomes trial, patients who were intolerant to statin therapies, bempedoic acid was associated with a reduced risk of major adverse cardiovascular events compared with placebo.[13] It is also available as a combination pill with ezetimibe, providing a convenient option for enhanced LDL-C reduction.
- Role in therapy: FDA-approved for use in patients with ASCVD or familial hypercholesterolemia who require additional LDL-C lowering beyond statins.[14]

**Inclisiran**

- Mechanism: Inclisiran is a novel small interfering RNA (siRNA) therapy that targets PCSK9 production at the genetic level, effectively reducing PCSK9 levels in the liver. By silencing the gene responsible for PCSK9 production, inclisiran provides sustained LDL-C reduction with only two doses per year.
- Efficacy: In ORION 10 and ORION 11, Wright et al., 2024 stated that inclisiran was linked with approximately 50% LDL reduction at 510 days when compared with placebo.[15]
- Advantages: Inclisiran's biannual dosing offers an advantage over more frequent PCSK9 injections, potentially improving patient adherence.
- Challenges: Although exploratory analysis from the ORION trials suggests that use of inclisiran may lead to reduction of MACE, these findings await confirmation in investigation of longer duration.[16]

## Lifestyle and Dietary Interventions

Lifestyle and dietary interventions are foundational to hyperlipidemia management, often serving as the first line of defense against high cholesterol and as adjuncts to pharmacotherapy. These strategies target risk factors through diet, exercise, weight management, and smoking cessation, contributing to long-term cardiovascular health.

Dietary Modifications

A heart-healthy diet is essential for managing cardiovascular risk, with Mediterranean and DASH diets emphasizing on fruits, vegetables, whole grains, lean proteins, and healthy fats from sources like nuts, olive oil, and fish. Increasing soluble fiber intake through foods like oats, legumes, and certain fruits can help lower LDL-C by binding cholesterol in the digestive tract and preventing its absorption, with studies showing that 5–10 grams per day can reduce LDL-C by about 5%.[17] Additionally, omega-3 fatty acids from fatty fish, flaxseeds, and walnuts do not directly lower LDL-C but play a crucial role in reducing triglycerides, another lipid linked to cardiovascular risk.

Physical Activity

Physical activity and weight loss can have a significant impact on lipid levels. Physical activity, such as 150 minutes per week of moderate-intensity exercise, can improve HDL-C levels and aid in weight management, both of which are beneficial for lipid profiles. Furthermore, aerobic exercises like walking, cycling, and swimming are particularly effective in reducing overall cardiovascular risk. Similarly, even modest weight loss of 5–10% can improve lipid levels, thereby lowering ASCVD risk.

Behavioral Interventions

Tobacco and alcohol cessation play vital roles in cardiovascular health. Smoking can damage blood vessels, in turn accelerating plaque build up and worsening the effects of hyperlipidemia. Smoking cessation not only improves lipid levels, but also significantly reduces overall cardiovascular risk within a few years. Similarly, while moderate alcohol intake, such as red wine, has been associated with improved HDL-C levels, excessive consumption can increase blood pressure and triglycerides alike. Guidelines generally recommend limiting alcohol intake to one drink per day for women and two drinks per day for men to maintain heart health.

Lifestyle and dietary interventions play a pivotal role in managing hyperlipidemia and enhancing overall health. They not only aid in LDL-C reduction but also address other ASCVD risk factors, making them a crucial part of any comprehensive treatment plan.

## Conclusion

In summary, hyperlipidemia management has evolved from a sole reliance on statins to a multifaceted approach that

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| If a patient **wants help quitting**, we offer phone, video or text coaching with FREE* cessation medications or NRT. | If your patient **wants to quit on their own**, we offer a Kickstart Kit with FREE NRT or a Quit Guide with tips. |

## Symptoms & how to combat them

If your patients are quitting and bring up symptoms like these, here are examples of tips you could recommend to help.

- **Cravings – Stand up and stretch, chew sugarless gum, drink water or eat a healthy snack.**
- **Bad mood/irritability – Take a walk or confide in a trusted person or support group.**
- **Dry mouth – Sip cold water, suck on ice chips or chew sugarless gum.**
- **Headaches – Take over-the-counter pain meds, take a warm shower or stretch muscles.**
- **Trouble sleeping – Take a warm shower, do relaxation exercises, avoid caffeine after noon.**

### Refer patients directly

Scan the QR code to get started with patient referrals today!

### Ways patients can enroll

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**Receiving free prescription medications requires a prescription from a provider, which may include an office visit charge or copay, depending on insurance status. The medication itself can be offered at no charge when a patient enrolls in enhanced coaching with the SD QuitLine.*

SOUTH DAKOTA QUITLINE

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*Sources: CDC*

incorporates nonstatin therapies, lifestyle changes, and personalized treatment plans based on patient risk. Updated guidelines emphasize the importance of individualized care, using both traditional statins and newer nonstatin therapies to optimize LDL-C levels and reduce ASCVD risk in high-risk groups.

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# Anti-Amyloid Therapies for Early Alzheimer's Disease: Evidence-Based Recommendations

Justin Persson, MD; and Glenn Voss, Pharm D

**Abstract**

*Background*: Alzheimer's disease (AD) is the most common cause of dementia in older adults and represents a growing public health burden. Traditional therapies offer only symptomatic relief without modifying disease progression. Recently approved anti-amyloid monoclonal antibodies, donanemab and lecanemab, represent a shift toward disease-modifying treatment in patients with mild cognitive impairment (MCI) or mild AD with confirmed amyloid pathology.

*Methods*: This review synthesizes current evidence from key clinical trials, real-world safety considerations, and expert-driven appropriate use recommendations (AURs) to guide the safe and effective use of donanemab and lecanemab.

*Results*: Both agents demonstrate statistically significant and clinically meaningful slowing of cognitive and functional decline in early symptomatic AD. Key differences exist in their mechanisms of action, dosing schedules, and treatment duration. Safety monitoring, particularly for amyloid-related imaging abnormalities (ARIA) and apolipoprotein E (APOE) ε4 genotyping, is an essential component of care.

*Conclusion*: Anti-amyloid therapies offer a meaningful step forward in AD management, but their use requires careful patient selection, biomarker confirmation, and adherence to safety protocols. As long-term outcomes and comparative effectiveness remain uncertain, continued surveillance, patient education, and equitable access will be important in optimizing the clinical impact of anti-amyloid therapies.

## Introduction

AD affects over 6 million individuals in the United States alone and accounts for the majority of dementia-related morbidity worldwide.[1] AD is characterized by a progressive decline in memory, cognition, and functional independence. Dementia-related costs are projected to exceed $2 trillion annually worldwide by 2030 without effective intervention or system-wide reforms.[1] These include direct medical expenses, long-term care, and informal caregiving burdens. Traditional therapies, primarily cholinesterase inhibitors and N-methyl-D-spartate (NMDA) receptor antagonists, have focused on symptomatic management, offering only modest benefits and limited long-term effectiveness without altering the underlying disease trajectory.[2]

Our understanding of AD pathophysiology, particularly the roles of beta-amyloid (Aβ) accumulation and tau pathology, has stimulated the development of disease-modifying therapies.[3,4] Among these, monoclonal antibodies targeting aggregated Aβ, specifically **lecanemab** and **donanemab**, have demonstrated clinically meaningful slowing of cognitive and functional decline in patients with early symptomatic AD. This is shown in large, well-powered, randomized controlled trials.[5,6] These agents represent a significant shift in the treatment paradigm, emphasizing early diagnosis, biomarker confirmation, and individualized risk-benefit discussions.

## Methods

A focused narrative review to identify recent clinical evidence on the use of anti-amyloid therapies, lecanemab and donanemab, for Alzheimer's disease was conducted. Searches were performed in PubMed and Scopus between January and April 2025, using MeSH terms and keywords such as *lecanemab*, *donanemab*, *Alzheimer's disease-modifying therapy*, and *anti-amyloid therapy*, combined with Boolean operators (AND, OR). Results were limited to English-language articles published from 2018 onward. Relevant grey literature, including FDA briefing documents, prescribing information, CDC materials, and Alzheimer's Association reports, were also reviewed. Titles and abstracts were screened for relevance, with full texts reviewed based on predefined inclusion criteria: studies reporting clinical trial

data, safety outcomes, treatment guidelines, or real-world considerations for either drug. Basic science articles without clinical applicability were excluded. Data were extracted into a structured spreadsheet capturing study design, population, outcomes, safety, and regulatory status. A medical librarian was not involved in the search process.

### Mechanism of Action

Lecanemab is a humanized IgG1 monoclonal antibody that selectively targets soluble Aβ protofibrils, which are believed to be the most neurotoxic forms of amyloid-β. By binding to these protofibrils, lecanemab facilitates their clearance and disrupts the aggregation process, thereby reducing soluble and insoluble Aβ deposits in the brain.[3,7]

Donanemab is a humanized IgG1 monoclonal antibody that targets N3pE-Aβ, a pyroglutamate-modified form of fibrillar amyloid-β found predominantly in mature amyloid plaques. This highly aggregated and chemically stable variant is thought to seed plaque growth. Donanemab's binding initiates a microglial-mediated immune response, leading to phagocytosis and accelerated clearance of dense-core plaques.[1,9] This selective approach may contribute to its rapid amyloid-lowering effects, which in clinical trials have allowed for treatment discontinuation based on plaque clearance but also may contribute to an increased risk of ARIA.[4]

### Efficacy Summary

Table 1 provides a summary of the major clinical trials that supported the approval process of donanemab and lecanemab, along with a breakdown of key efficacy outcomes.

Strength of Evidence: Level 1.

### Patient Selection and Diagnosis

- Diagnosis of MCI or mild AD based on established NIA-AA criteria (Figure 1).
- Confirmation of amyloid pathology is essential and may be obtained via
  - Amyloid PET imaging
  - Serum biomarkers (e.g., p-tau217, or Aβ42/Aβ40)
  - CSF biomarkers (e.g., Aβ42/Aβ40 or p-tau181/Aβ42 ratios).
- Mini-Mental State Examination (MMSE) Score of 20 or greater for donanemab and 22 or greater for lecanemab.[3 4 5]

**Figure 1. NIA-AA diagnostic criteria.**

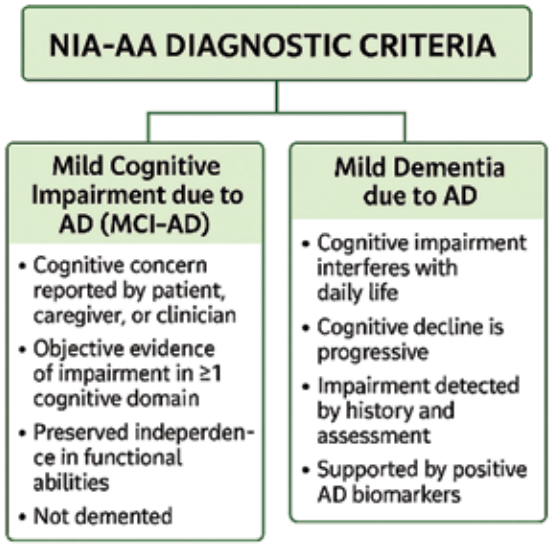


**Table 1. Comparative efficacy of donanemab and lecanemab in early Alzheimer's disease.**

| Drug | Trial name | Population | Primary outcome | Key result | Secondary outcomes | Trial duration |
|---|---|---|---|---|---|---|
| **Lecanemab** | CLARITY-AD[8] | MCI/Mild AD; MMSE ≥ 22 | **CDR-SB** (18-mo change) | **27% relative slowing** vs placebo 1.21 vs 1.66 $p<0.001$ | ADAS-Cog ↓<br>ADCOMS ↓<br>Amyloid PET ↓ | 18 mo |
| **Donanemab** | TRAILBLAZER-ALZ 2[9] | MCI/Mild AD; MMSE ≥ 20 | **iADRS** (cognitive-functional) | **35% relative slowing**<br>**39% lower risk of progression**<br>$p<0.001$ | CDR-SB ↓<br>ADAS-Cog ↓<br>Amyloid PET ↓ | 18 mo |

Abbreviations:
ADAS-Cog = Alzheimer's Disease Assessment Scale–Cognitive Subscale
ADCOMS = Alzheimer's Composite Score
CDR-SB = Clinical Dementia Rating–Sum of Boxes
iADRS = Integrated Alzheimer's Disease Rating Scale
MMSE = Mini-Mental State Examination
NIA-AA = National Institute on Aging – Alzheimer's Association

### Adverse Events

Amyloid-related imaging abnormalities (ARIA) are among the most clinically significant adverse effects associated with anti-amyloid monoclonal antibodies. The risk of ARIA is highest in the first six months of treatment.[2] These abnormalities are classified into:

- **ARIA-E**: Vasogenic edema or sulcal effusion
- **ARIA-H**: Cerebral microhemorrhages or superficial siderosis

ARIA can be further categorized by severity, with corresponding management and follow-up recommendations outlined in Table 2.

**Table 2. ARIA management.**

| ARIA Severity | Symptoms | Management | Follow-up Imaging |
|---|---|---|---|
| **Mild, asymptomatic** | None | Continue treatment **or** temporarily hold, based on clinical judgment | MRI in 4–8 wks |
| **Moderate, symptomatic** | Headache<br>Mild Confusion | Hold treatment until radiographic resolution | MRIs every 4–6 wks until resolution |
| **Severe or persistent symptoms** | Moderate to Severe Confusion<br>Seizure | Discontinue treatment<br>Initiate steroids if clinically indicated (dexamethasone taper over 5–7 days) | MRIs every 4 wks until resolution |

**Table 3. Leqembi side effects.**

| Side effect | Leqembi | Placebo |
|---|---|---|
| Symptomatic ARIA*<br>Serious symptoms associated with ARIA | 3%<br>0.7% | |
| ARIA (including asymptomatic and symptomatic) | 21% | 9% |
| ARIA-E | 13% | 2% |
| ARIA-H | 17% | 9% |
| Intracerebral hemorrhage >1 cm in diameter | 0.7%† | 0.1% |
| Infusion-related reaction | 26.4% | 7.4% |

**Table 4. Kisunla side effects.**

| Side effect | Kisunla | Placebo |
|---|---|---|
| ARIA-H microhemorrhage | 25% | 11% |
| ARIA-E (symptomatic) | 24% (6.1%) | 2% (0.1%) |
| ARIA-H superficial siderosis | 15% | 3% |
| Intracerebral hemorrhage >1 cm in diameter | 0.4% | 0.2% |
| Infusion-related reaction | 9% | 0.5% |

### Re-initiation Criteria

- May resume treatment once:
  - Symptoms have resolved,
  - ARIA has resolved or stabilized on imaging,
  - Risk-benefit has been reassessed with the patient and family.
- *In some cases, especially with recurrent ARIA or severe imaging findings, permanent discontinuation is recommended.*

The incidence of ARIA varies by treatment and genetic risk factors. Notably, APOE ε4 homozygotes have been shown to have approximately double the risk of developing ARIA compared to non-carriers.[3,9] Consequently, APOE genotyping is highly recommended before therapy initiation to support risk stratification and guide shared decision-making.

Strength of Evidence: Level 1–2[3,9]

Although many cases of ARIA are asymptomatic and detected on surveillance imaging, symptomatic events, such as headache, confusion, visual changes, or dizziness, may occur and require prompt evaluation. The side effects of Leqembi (lecanemab) are listed in Table 3, and the side effects of Kisunla (donanemab) are listed in Table 4.

### Surveillance Imaging

The AURs recommend baseline MRI prior to treatment, with follow-up scans before the 5th, 7th, and 14th infusions for lecanemab and before the 2nd, 3rd, 4th, and 7th for donanemab, or earlier if symptoms emerge.[3,4]

### Practical Considerations for Clinical Use

Anti-amyloid treatments represent a significant advancement in the management of early AD. However, these therapies are not curative and do not reverse existing memory loss. Rather, they have been shown to modestly slow the rate of cognitive and functional decline in patients with MCI or mild AD.[3,4,9]

- Specialist Evaluation Required: Diagnosis of AD and initiation of anti-amyloid therapy must be performed by a neurologist or geriatrician, following established diagnostic criteria and biomarker confirmation.[3]
- Treatment Duration:
  - Donanemab employs a limited-duration regimen, allowing discontinuation once amyloid plaques are

cleared, as confirmed by PET imaging.[4,9]

- Lecanemab is intended as a chronic therapy, continuing until the patient progresses to moderate-stage AD.[3]

- Patients must not be on anticoagulants at treatment initiation due to an elevated risk of intracerebral hemorrhage. If anticoagulation becomes necessary during treatment, mAb therapy should be discontinued.[3]
  - Individuals with evidence of cerebral amyloid angiopathy on initial MRI are not eligible for therapy due to increased bleeding risk.[4]
  - mAb therapy will be held if ARIA is identified, and continued treatment will be re-evaluated based on he severity.
- Dosing and Safety Considerations:
  - Donanemab's less frequent dosing schedule (monthly) may offer logistical advantages compared to lecanemab's biweekly administration. However, a weekly subcutaneous self-injection of lecanemab has recently been FDA-approved for maintenance dosing.[4]
  - Lecanemab's safety profile is generally regarded as more favorable, with a lower overall incidence of ARIA and relate complications.[3,9]
- Trial Population Differences: Caution is advised when comparing efficacy across trials, as baseline cognitive function differs. Participants in the donanemab (TRAILBLAZER-ALZ 2) trial were more cognitively impaired at baseline, which may influence the interpretation of outcome measures.[9]
- Provider Registry Participation (e.g., CMS coverage) is mandatory for Medicare reimbursement.[9]
- Table 5 presents a concise, comparative summary of Leqembi and Kisunla.

## Discussion

The emergence of anti-amyloid therapies represents a notable development in the treatment landscape for early Alzheimer's disease. These agents offer a biologically targeted approach to modifying the disease process in Alzheimer's, but their clinical benefits remain modest, and the real-world impact is still being clarified.

Despite achieving statistically significant slowing of cognitive decline, the clinical meaningfulness of these outcomes is debated, especially in the context of heterogeneity across trials and modest effect sizes.[9] Access limitations, including the availability of amyloid PET scans, CSF biomarker testing, and the complexities of safety monitoring and registry enrollment, further hinder implementation.

Perhaps most importantly, the substantial costs associated with these therapies, spanning drug pricing, serial imaging, genetic testing, and infusion delivery, pose a serious threat to equity of access, particularly for underserved populations. Questions remain about whether the modest slowing of cognitive decline justifies the financial burden placed on patients, families, and the healthcare system. As such, thoughtful patient selection, transparent communication about treatment goals, and policy-driven strategies to reduce barriers will ensure fair and effective use of these therapies in clinical practice.

**Table 5. Quick facts.**

| | |
|---|---|
| Therapeutic class | Aβ-directed mAb |
| Use | Treatment of early AD with mild cognitive impairment (efficacy has not been studied in moderate to severe AD) |
| Dosing | Leqembi: 10 mg/kg IV every 2 weeks, infused over 1 hour<br>Kisunla: 700 mg IV every 4 weeks x 3 doses, infused over 30 minutes; then 1400 mg IV every 4 weeks, infused over 30 minutes |
| Mechanisms of action | Reduces the number of aggregated and insoluble forms of Aβ |
| Adverse reactions | Infusion-related reaction (fever and flu-like symptoms, nausea, vomiting, hypotension, hypertension, and oxygen desaturation)<br>ARIA:<br>• Usually asymptomatic<br>• Reported symptoms may include headache, confusion, visual changes, dizziness, nausea, and gait difficulty<br>• Serious and life-threatening events, including seizure and status epilepticus, rarely occur<br>Headaches |
| Monitoring parameters | MRI monitoring prior to initiation and throughout the first year of treatment<br>Leqembi Surveillance MRIs: Baseline, Prior to 5th, 7th, and 14th infusions to evaluate for ARIA<br>Kisunla Surveillance MRIs: Baseline, Prior to 2nd, 3rd, 4th and 7th infusions to evaluate for ARIA |
| Prescriber | Neurologist with a referral |
| CMS considerations | CMS covers Leqembi and Kisunla broadly under Medicare.<br>Prescribing providers must participate in the CMS National Patient Registry.<br>To receive Medicare coverage:<br>• Must be enrolled in Medicare<br>• Must be diagnosed with MCI or mild AD with appropriate biomarker positivity (amyloid PET or CSF tau/amyloid)<br>• Have the provider participate in a qualifying registry with an appropriate clinical team and follow-up |
| Duration of treatment | Leqembi: Recommend discontinuation once the patient reaches the moderate stages of AD.<br>Kisunla: Consider discontinuation based on reduction of amyloid plaques to minimal levels on amyloid PET imaging. Of note, there is no guidance for reinitiating therapy if amyloid plaques occur again. |
| Cost | Leqembi: Estimated medication cost of $26,500 per year, based on an average patient weight of 75 kg.<br>Kisunla: Estimated medication cost of $32,000 per year (total cost of therapy will depend on when the patient completes treatment).<br>Medication is expensive but only a portion of the cost as monitoring and administration are also expensive. |

Additionally, patient and caregiver education are essential to ensure realistic expectations. These treatments are not curative and do not halt or reverse cognitive decline. Still, they offer a meaningful slowing of disease progression during its earliest symptomatic stages, representing an important step forward in AD care.

Looking ahead, multiple phase 4 studies are underway to further evaluate the long-term efficacy, safety, and real-world utility of anti-amyloid therapies. Importantly, comparative effectiveness studies are needed to assess head-to-head differences between donanemab and lecanemab, especially in terms of cognitive outcomes, safety profiles, cost-effectiveness, and patient-centered measures, such as quality of life. Additionally, the long-term safety implications of chronic lecanemab use remain uncertain, particularly given the potential cumulative risk of ARIA and the as-yet-unknown consequences of prolonged amyloid suppression. These unanswered questions underscore the importance of ongoing surveillance, transparent data sharing, and continued clinical investigation to refine treatment strategies and optimize outcomes in Alzheimer's disease.

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# Evaluation and Management of Anxiety Disorders in Children and Adolescents

Thomas Vierhout, MD, MS; and Shawn Van Gerpen, MD

**Abstract**

Anxiety disorders are one of the most commonly diagnosed psychiatric disorders in children and adolescents, with an estimated lifetime prevalence in the United States of 20-30%. These disorders can have significant adverse effects on child development, making their diagnosis and treatment critical. Screening resources are available to aid in identification and diagnosis. Treatments include both pharmacologic and non-pharmacologic interventions. Depending on the severity of presentation, providers may consider cognitive behavioral therapy (CBT) first line. Selective serotonin reuptake inhibitors (SSRIs) are first-line pharmacologic treatment and have been shown to improve anxiety symptoms. Combination treatment with an SSRI and CBT may have improved outcomes compared to monotherapy. Serotonin and norepinephrine reuptake inhibitors (SNRIs) may also be considered for the treatment of anxiety disorders. While benzodiazepines have been used to treat anxiety disorders historically, there is insufficient evidence of efficacy to be currently recommended, especially when combined with potential adverse effects. Treating anxiety disorders can be more difficult in patients with comorbid psychiatric conditions such as attention-deficit/hyperactivity disorder (ADHD). Although the management of anxiety disorders in children and adolescents can be challenging, screening tools, pharmacologic and non-pharmacologic interventions, and emerging support resources exist to aid the provider.

## Introduction

Anxiety disorders are one of the most commonly diagnosed psychiatric disorders in children and adolescents, with an estimated lifetime prevalence in the United States of 20-30%.[1] Anxiety disorders can be divided into a variety of sub-categories as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM, currently version 5-TR).[2] As childhood fears and anxieties are part of normal development, providers need to differentiate between normal and pathological variations of anxiety. Untreated anxiety disorders in children can lead to multiple adverse social, educational, and occupational outcomes.[3] Additionally, 9% of children with anxiety disorders report suicidal ideation and 6% report prior suicide attempts.[4] Improved awareness, identification, and treatment of child and adolescent anxiety disorders may have a meaningful and positive impact on these patients.

## Etiology, Epidemiology, and Course

Studies using functional magnetic resonance imaging (fMRI) have implicated multiple amygdala-based networks throughout the prefrontal cortex as being dysfunctional in adolescent patients with anxiety disorders.[5] Posterior regions, including the cuneus and precuneus, may also contribute. In adolescents with fear-based anxiety disorders, the amygdala, the structure that initiates central fear responses, is commonly overactivated.[6] Little data, however, connects neuroimaging findings with severity of symptoms or outcomes.

Anxiety symptoms, and their corresponding disorders, represent the most frequent psychiatric disorders in children, and likely due to the early appearance of specific phobias, may represent the "earliest forms of psychopathology".[7] Sex differences exist and are accentuated by development, with anxiety disorders showing increased prevalence in adolescent females compared to males.[6,8] Although some patients do experience a remitting course, anxiety disorders are often chronic, persisting into adulthood.[6,9] Factors that may influence the course of anxiety disorders in adolescents include social media[10] and cannabis use.[11]

## Evaluation and Diagnosis

A thorough evaluation is required prior to diagnosing and treating an anxiety disorder, and includes the identification of symptoms and their frequency, severity, onset, duration, degree of distress and impairment; development abnormalities; and physical signs. Screening resources are available to identify anxiety concerns. Resources include freely available general social-emotional screening instruments (e.g., Pediatric Symptom Checklist[12]) and the Strengths and Difficulties Questionnaire.[13] The initial concern for anxiety

may come from the patient or the parents. The American Psychiatric Association (APA) developed the parent- and self-rated Level 1 Cross-Cutting Symptom Measures[14] to screen for anxiety, in addition to multiple other psychiatric disorders.

The DSM-5 provides diagnostic criteria for 11 anxiety disorders: separation anxiety, selective mutism, specific phobia, social anxiety, panic, agoraphobia, generalized anxiety, substance/medication-induced anxiety, anxiety disorder due to another medical condition, other specified anxiety disorder, and unspecified anxiety disorder. Of these disorders, specific phobia (lifetime prevalence rate 20%), social anxiety (9%), separation anxiety (8%), generalized anxiety (2%), panic (2%), and agoraphobia (2%) are the most common.[1] When attempting to diagnose an anxiety disorder, clinicians should utilize DSM-5 criteria to increase diagnostic accuracy.

### Treatment

An effective treatment plan should stem from the patient's diagnosis and overall clinical presentation. The appropriate level of care is chosen based on the patient's symptom severity and risk of harm to themselves or others. An effective treatment plan is chosen in collaboration with the patient and family, taking into consideration their prior medical history, current medical or psychiatric disorders, and the child's support system.

An initial intervention to consider is cognitive behavioral therapy (CBT). CBT is a broad range of interventions aimed at addressing the cognitive, behavioral, and physiologic aspects of anxiety.[1] Specifically, it focuses on the cognitive distortions surrounding the perceived threats, the behavioral avoidance of adverse situations, and the physical symptoms of autonomic arousal. Structured CBT involves 12-20 sessions with collaboration between the patient, family, and possibly teachers. CBT has been studied in children ages 6-18 years. In meta-analyses, CBT improved primary anxiety symptoms when compared to inactive controls, as reported by the child, parent, and physician.[15–19]

Another important aspect of psychotherapy is the role of parents in the treatment of anxiety. Early studies showed a benefit for combined parent-child treatment over child-only treatment[20] but later research reported comparable outcomes.[21,22] One study, which utilized the Supportive Parenting for Anxious Childhood Emotions (SPACE) program as a way to reduce family accommodations, or actions performed by the family to help alleviate the patient's anxiety symptoms, demonstrated noninferiority to CBT.[23]

Providers should be aware of the potential role for online mental health resources. Some adolescents prefer online resources and may be useful in decreasing stigma. A systematic review noted the potential for online resources while highlighting difficulties such as low retention rates.[24] Studies reviewed both depression[25,26] and anxiety.[27,28] Currently available resources include those based on CBT, acceptance commitment therapy (ACT), mindfulness, and positive psychology.

First-line pharmacotherapy for anxiety disorders in adolescents are the selective serotonin reuptake inhibitors (SSRIs), with the American Academy of Child and Adolescent Psychiatry (AACAP) recommending they be offered to patients ages 6 to 18 years with social anxiety, generalized anxiety, separation anxiety, or panic disorder.[1] In the reviewed meta-analyses, SSRIs improved primary anxiety, response to treatment, and remission.[29–31] Additionally, CBT combined with an SSRI improved response to treatment when compared to SSRIs or CBT alone, and is recommended by AACAP.[1] SSRIs as a class work by inhibiting the presynaptic reuptake of serotonin in the brain, increasing available serotonin. This inhibition downregulates inhibitory serotonin autoreceptors, increases serotonergic neuronal firing rates, and elevates serotonin release. This mechanism leads to a delayed response to the medication, with statistically significant improvement in anxiety symptoms at 2 weeks, clinically significant improvement at 6 weeks, and maximum response by 12 weeks or later.[30]

Although evidence exists for the safety and efficacy of SSRIs in treating anxiety disorders, there is no specific SSRI with U.S. Food and Drug Administration (FDA) approval for this indication; four do exist for the treatment of obsessive compulsive disorder (OCD). There is a black box warning for all SSRIs for suicidal thinking and behavior through age 24; however, absolute rates of suicidal ideation for all antidepressant medication and all non-OCD anxiety disorders were reported as 1% for those treated, as opposed to 0.2% for those in the placebo arm.[32] With a number needed to treat (NNT) of 3 and a number needed to harm (NNH) of 143, the evidence supports judicious and well-monitored use, especially as efficacy appears greatest for anxiety disorders.

For SSRIs as a class, there are adverse effects and interactions of which providers should be aware. Typical side effects include: behavioral activation/agitation including insomnia, impulsiveness, and aggression. Mania or hypomania has also been reported and may be difficult to distinguish from behavioral activation.[1] Sexual dysfunction is a potential side effect, and seizures have been observed in patients on SSRIs. Serotonin syndrome is a consideration with any

serotonergic medication and can manifest as mental status changes, neuromuscular hyperactivity, and autonomic hyperactivity. The combination of serotonergic medications is more concerning for serotonin syndrome. Additionally, abrupt stoppage of some SSRIs may cause discontinuation syndrome.[33]

SSRIs have been shown to improve anxiety symptoms and are generally well tolerated. Fluoxetine, although not FDA-approved for anxiety, is approved for use in children over the age of 7 for depression.[6,34] Escitalopram has also received FDA approval for the treatment of adolescent depression. Due to its long half-life, fluoxetine may have an added benefit compared to other medications in the class in helping to reduce the risk of withdrawal or discontinuation symptoms in less medication-compliant patients. Paroxetine,[35] fluvoxamine,[36] and sertraline,[37] however, have a short half-life and carry risks for discontinuation syndrome. Citalopram, at dosages of 40 mg per day or greater, has shown an increased risk of QT prolongation and potentially Torsades de Pointes.

The serotonin and norepinephrine reuptake inhibitors (SNRIs) are another class of medication that can be used to treat anxiety disorders. Medications within this class are pharmacologically distinct but all inhibit the reuptake of serotonin and norepinephrine. Although norepinephrine and noradrenergic neurons are involved in stress responses, noradrenergic medications are effective in anxiety disorders due to interactions between norepinephrine, serotonin, and other neurotransmitters.[1] SNRIs are effective at improving primary anxiety symptoms when compared to placebo[15] and are generally well tolerated. Adverse effects of SNRIs include nausea, vomiting, headache, insomnia, somnolence, and decreased appetite. They have also been associated with increased blood pressure and pulse rate. Similar to SSRIs, SNRIs have the potential adverse effects of mania/hypomania, sexual dysfunction, and serotonin syndrome. Duloxetine has been associated with hepatic failure, cholestatic jaundice, and skin reactions including erythema multiforme and Stevens-Johnson syndrome.

Duloxetine is the only SNRI to carry an FDA indication for the treatment of generalized anxiety disorder in children and adolescents aged 7-17 years old. Its half-life allows once daily dosing. Venlafaxine and desvenlafaxine are also candidates for the treatment of anxiety disorders. Venlafaxine immediate release requires dosing twice or three times per day, but venlafaxine extended release and desvenlafaxine allow once daily dosing.

Another option for the treatment of anxiety disorders is the $5HT_{1A}$ agonist buspirone. Open-label studies have shown improvement in anxiety in children and adolescents.[38] Adverse effects included nausea, stomachaches, and most commonly lightheadedness, but the medication is generally well tolerated. It lacks abuse potential and is not sedating like benzodiazepines.[39]

Benzodiazepines have been used to treat anxiety disorders but there is limited evidence for or against their use in children and adolescents. Benzodiazepines work by binding the $GABA_A$ receptor to potentiate the effect of gamma-aminobutyric acid (GABA), an inhibitor neurotransmitter. One study found no improvement in anxiety symptoms or clinical global improvement when comparing children treated with alprazolam versus placebo.[6] There are concerns for tolerability as benzodiazepines are associated with irritability, fatigue, drowsiness, and oppositional behavior, as well as concerns for the addictive nature of the medications.[6,31] Alternatively, the use of hydroxyzine, an antihistamine, may provide a safer alternative option to help manage acute symptoms of anxiety.

Another possible challenge to treating children with anxiety disorders is comorbid attention-deficit/hyperactivity disorder (ADHD). These two conditions are estimated to co-occur in 25-35% of children.[40] Stimulant medications are commonly prescribed for children with ADHD but anxiety, hypertension, and agitation are noted as relative contraindications for their use. Atomoxetine is a specific inhibitor of the norepinephrine transporter and is approved for the treatment of ADHD. Some studies have also examined its use in comorbid ADHD and anxiety disorders, with benefits shown for symptoms of both disorders.[41]

## Conclusions

Anxiety disorders are common in children and adolescents and can cause significant distress in multiple aspects of a patient's life. Identification of these symptoms is critical and screening tools exist to aid the provider. CBT or SSRIs can be considered first line treatments, depending on the severity of presentation. A combination treatment of CBT and an SSRI may be more effective than either treatment on its own. With the advent of online resources and new therapy regimens, support for these patients will continue to grow.

## REFERENCES

1. Walter HJ, Bukstein OG, Abright AR, Keable H, Ramtekkar U, Ripperger-Suhler J, Rockhill C. Clinical practice guideline for the assessment and treatment of children and adolescents with anxiety disorders. J Am Acad Child Adolesc Psychiatry. 2020 Oct;59(10):1107–24.

*Please note: Due to limited space, we are unable to list all references. You may contact South Dakota Medicine at ereiss@sdsma.org for a complete listing.*

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# Member News

Visit www.sdsma.org for the latest news and information.

## Message from the CEO

It has been my pleasure to serve as the new CEO for SDSMA following the incredible tenure of Barb Smith who retired on October 31. 2025 was a year of change for the SDSMA staff and I thank them for their commitment to our association and members we serve. I also want to thank Terry Marks who has served our association for over 40 years and wish her the very best in retirement.

I sincerely thank each member who has renewed their membership for 2026 and encourage others to consider joining so we can keep building a strong unified voice for physicians in South Dakota. We are grateful for your engagement with the SDSMA and your local district medical society. The current healthcare landscape is challenging and we need your support to continue to advocate for patients, support each other, and uphold the highest standards of the medical profession.

As we look forward into the new year, we are working to give your association more visibility, a louder voice, and greater impact in the medical school and the communities we serve. We also want to support physician well-being and leadership. We encourage you to reach out and learn more about our existing programs. Our journal, *South Dakota Medicine*, is extremely beneficial to our membership so you will see more opportunities and activities in 2026 to get involved with this peer-reviewed publication to enhance your profile and promote the art and science of medicine. I will be sharing our plans on how we will accomplish these goals in the new year.

Please join us as we evolve and adjust to your needs and raise our collective voice to ensure a strong future for medicine in South Dakota. The SDSMA will continue to advocate for physicians, residents and medical students to advance the practice of medicine.

If you are looking for opportunities to give back, you can consider a donation to the SDSMA Foundation or PAC, which can be found on our website at sdsma.org. To renew your membership or speak with a staff member, call 605-336-1965 or email membership@sdsma.org.

Thank you for your support and join us in 2026!

Sincerely,

Tammy Hatting, CEO

## SDSMA Legislative Day – February 3

### *Help make physician voices heard at the State Capitol during the SDSMA's Legislative Day*

Show legislators your support for patients and the medical profession by attending the SDSMA's 2026 Legislative Day. The association will be sponsoring an afternoon snack break in the Speaker's and President's lobbies in the State Capitol from **1:00-3:00 pm Tuesday, February 3**.

Join your colleagues to interact with legislators and promote the SDSMA's advocacy priorities. This is a great opportunity to meet and become better acquainted with your elected representatives.

**When:** Tuesday, February 3, 2026 | 1:00 PM – 3:00 pm

**Where:** Speaker's and President's Lobbies, State Capitol, Pierre

**Why Attend?** Legislators need to hear directly from physicians – build lasting relationships

**Registration:** Visit sdsma.org to register (no cost)

Additionally, the evening prior – Monday, February 2 – physicians are encouraged to attend a social hour and reception hosted by the University of South Dakota Sanford School of Medicine at the AmericInn.

We look forward to seeing you in Pierre!

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## Don't Let Your Member Benefits Expire – There is Still Time to Renew!

Thank you for your membership in the SDSMA. Association renewal is annual and runs on the calendar year from January through December. If you haven't yet, please visit the link/instructions that were sent to your email to renew. There is still time!

We look forward to another great year of providing physicians with valuable benefits. SDSMA membership gives you access to networking and leadership opportunities with your local colleagues in your district medical society, a subscription to the peer-reviewed journal *South Dakota Medicine* and waived manuscript submission fees, your name and practice information in the physician directory, and advocacy on behalf of patients and the medical profession.

- **Advocacy.** Participate in opportunities to have your voice heard. The SDSMA advocates at the state and federal levels on key health care issues impacting patients and physicians.
- **Professional growth.** Grow leadership skills through the SDSMA Health Leadership Institute, committee involvement, and events.
- **Well-Being.** Navigate the stressors of today's ever-changing healthcare landscape and prioritize wellness with the South Dakota Physician Well-Being Program.

Thank you to those who have already renewed. If you haven't yet, please complete your renewal today!

## SDSMA Doctor of the Day Program

The SDSMA is asking physicians to volunteer for the association's Doctor of the Day Program at the State Capitol during the 2026 legislative session. This volunteer opportunity involves one day at the State Capitol in Pierre by providing basic medical assistance to elected representatives and staff as needed. The legislative session goes from January 13 through March 30.

**Register:** Sign up to be a Doctor of the Day at sdsma.org.

Doctor of the Day volunteers have the unique opportunity to interact with legislators and get a first-hand look at the legislative process and how it affects the practice of medicine. Your presence at the Capitol shows legislators not only your expertise, but also your concern for the health of South Dakotans. It is critical that volunteer physicians are serving each day of session. Every year we receive requests from PAs and NPs who wish to participate in the program.

**Questions?** Contact Justin Ohleen at 605.336.1965 or johleen@sdsma.org.

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## Vaccine Day of Advocacy – South Dakota Families for Vaccines

**When:** Thursday, February 12 | 10:30-1:00 Speak with legislators about the importance of pro-vaccine policies and serve lunch to legislators. 1:00-3:00 – Attend House and Senate sessions

**Register:** Sign up at www.sdfamiliesforvaccines.org/2026dayofadvocacy

# 2026 South Dakota Legislative Directory

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State Capitol, 500 E. Capitol Ave, Pierre, SD 57501

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# 2026 South Dakota Legislative Directory

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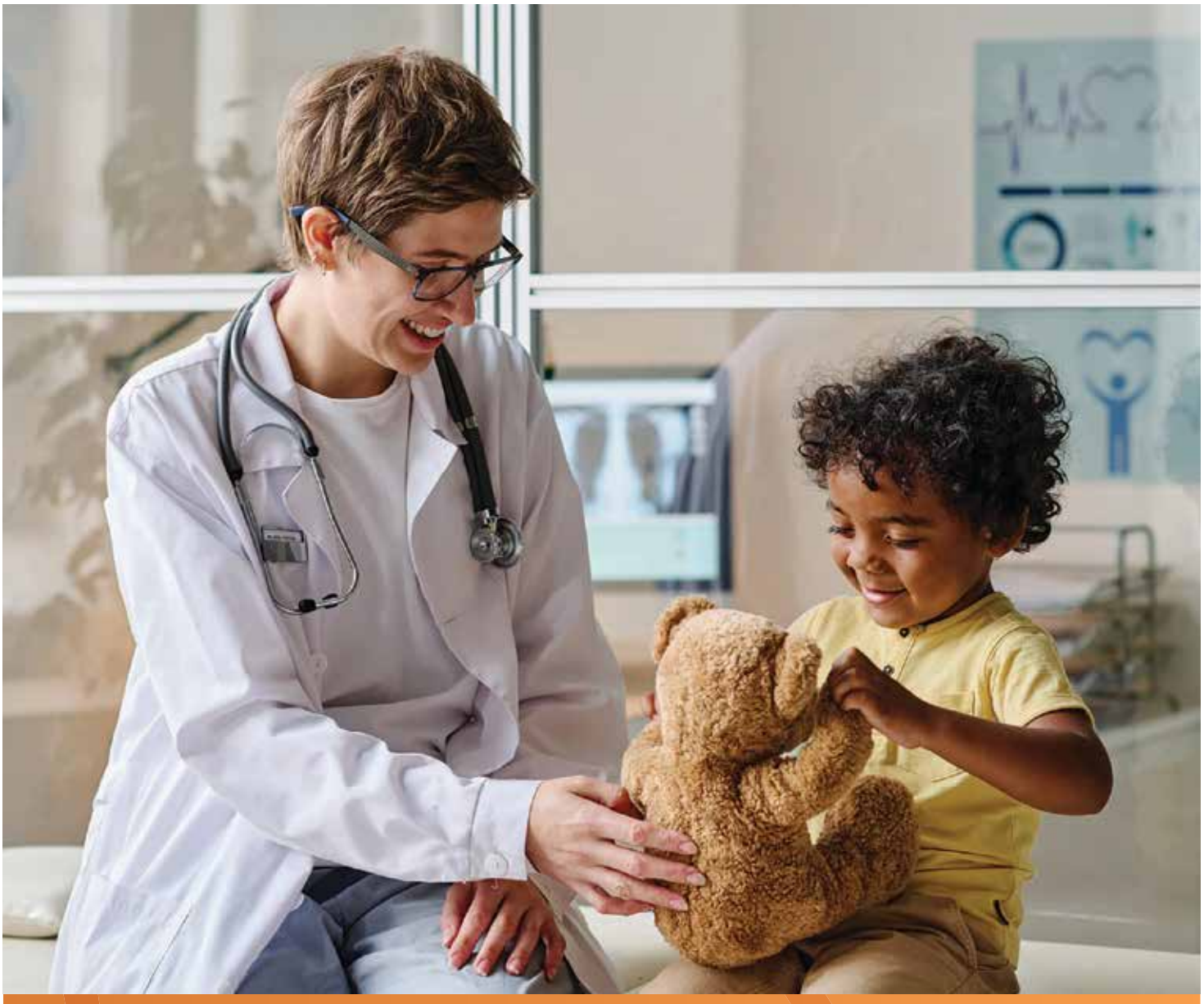

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