

NEUROLOGICAL CLUSTER • CONGENITAL • PEDIATRIC

Spina Bifida

nursing care & teaching

A neural tube defect (NTD) in which the vertebral arches fail to close during the first month of fetal development, leaving spinal contents exposed or unprotected. Severity ranges from a hidden vertebral gap to full spinal cord exposure. **The newborn priorities are protection of the sac, infection prevention, and a latex-free environment from birth.**

NGN NCLEX 2026

NEURO • PEDS

NCJMM-ALIGNED

HIGH-YIELD

SOURCE TRANSPARENCY

This topic was not present in your uploaded personal notes. Content compiled from standard NCLEX-RN references: *Saunders Comprehensive Review for the NCLEX-RN 2026*, *ATI Maternal Newborn & Pediatric Content Mastery*, *Hockenberry & Wilson's Wong's Nursing Care of Infants and Children*, the Spina Bifida Association clinical care guidelines, and CDC folic acid recommendations.

01

DEFINITION • THREE TYPES

What Spina Bifida Is

Spina bifida is a **neural tube defect (NTD)** — incomplete closure of one or more vertebrae around the spinal cord. The three types differ in **what is protruding through the defect**, which determines neurologic involvement.

Occulta

MILDEST

A vertebral gap with **no sac and no protrusion**. The skin is closed. Often discovered incidentally.

Skin cues: dimple, tuft of dark hair, port-wine birthmark, or lipoma over lower back. Usually no neuro deficit.

Meningocele

MODERATE

Sac protrudes through the defect containing **meninges + CSF only**. The spinal cord stays in place.

Neuro: Usually no motor or sensory deficit. Sac is still vulnerable to rupture and infection.

Myelomeningocele

MOST SEVERE

Sac contains **meninges + CSF + spinal cord and nerve roots**. Most common symptomatic form.

Neuro: Motor & sensory loss below the defect, neurogenic bladder/bowel, frequent hydrocephalus.

02

MECHANISM • EMBRYOLOGIC ORIGIN

Pathophysiology

1 Neural tube begins to close **days 17–30** of gestation (often before pregnancy is known).

2 **Folic acid deficiency** + genetic factors disrupt closure of the posterior neuropore.

3 Vertebral arches fail to fuse → opening in spinal column (usually lumbosacral).

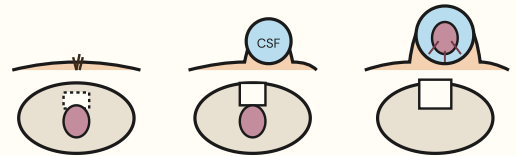
4 Meninges & possibly spinal cord **herniate through the defect** forming a sac.

5 Neural tissue damage + impaired CSF flow → motor/sensory deficits and **hydrocephalus** (Chiari II malformation in >80% of myelomeningocele).

OCCULTA

MENINGOCELE

MYELO-MENINGOCELE



closed gap sac: meninges + CSF sac: + spinal cord

LEGEND

- skin
- vertebra
- CSF / sac
- spinal cord

Defects most common at lumbosacral level

Three types compared: vertebral closure, sac contents, neural involvement

03

ETIOLOGY • MODIFIABLE & NON-MODIFIABLE

Risk Factors

FOLIC ACID DEFICIENCY

The strongest modifiable risk.
Insufficient B9 during periconception period.

MATERNAL DIABETES

Poorly controlled pre-gestational diabetes increases NTD risk.

MATERNAL OBESITY

Pre-pregnancy BMI > 30 raises NTD risk independently.

ANTI-SEIZURE DRUGS

Valproic acid & carbamazepine interfere with folate metabolism.

MATERNAL HYPERTHERMIA

First-trimester fever or hot tub exposure.

FAMILY HISTORY

Prior NTD pregnancy → 4 mg folic acid daily (not 0.4 mg).

ETHNICITY

Higher incidence in Hispanic populations; varies geographically.

LOW SOCIOECONOMIC STATUS

Linked through nutritional access & prenatal care.

04

ASSESSMENT • BY SEVERITY

Signs & Symptoms

Mild • Occulta / Meningocele

- Skin dimple, hair tuft, or birthmark over lower spine
- Small lipoma at midline
- Usually no motor or sensory deficit
- Sac (meningocele) is fluid-filled, intact, midline
- Normal bladder & bowel function
- Bladder/bowel changes possible if tethered cord develops

Severe • Myelomeningocele

- Visible sac on back containing neural tissue
- Flaccid paralysis & sensory loss below defect
- Neurogenic bladder → urinary retention & reflux
- Neurogenic bowel → constipation, incontinence
- Hydrocephalus (Chiari II malformation, >80%)
- ↑ Head circumference, bulging fontanel, sunset eyes
- Clubfoot, hip dysplasia, scoliosis
- High latex allergy risk from repeated exposures

05

ABC FRAMEWORK • NEWBORN / PRE-OP

Priority Nursing Interventions — Pre-op

△ SURGICAL CLOSURE USUALLY WITHIN 24-72 HOURS OF BIRTH TO PREVENT INFECTION & FURTHER NERVE DAMAGE

A • AIRWAY/SAFETY

Protect the Sac

- ▶ **Prone position** — never supine
- ▶ Cover sac with **sterile, saline-moistened, non-adherent** dressing
- ▶ Keep dressing moist; replace per protocol
- ▶ Avoid any pressure on the sac
- ▶ No diapering over the defect

B • BREATHING

Infection Prevention

- ▶ Keep sac free of urine & stool
- ▶ Cleanse perineum frequently; clean from front to back
- ▶ Monitor sac for tears, leakage, color change
- ▶ Prophylactic antibiotics per order
- ▶ Strict aseptic technique with dressings

C • CIRCULATION

Neuro & Latex

- ▶ **Latex-free environment from birth**
- ▶ Measure head circumference daily
- ▶ Palpate fontanel each shift
- ▶ Assess lower extremity movement, anal wink, bladder fullness
- ▶ Maintain neutral thermal environment (warmer)

06

ABC FRAMEWORK • POST-OP & LONG-TERM

Priority Nursing Interventions — Post-op

WOUND

Surgical Site Care

- ▶ Continue **prone or side-lying** positioning until incision heals
- ▶ Assess incision for redness, drainage, dehiscence
- ▶ Keep area clean & dry; protect from contamination
- ▶ Sterile dressing changes per orders
- ▶ Manage pain — assess with FLACC or N-PASS scale

ICP

Monitor for Hydrocephalus

- ▶ Measure head circumference **daily**
- ▶ Bulging fontanel, high-pitched cry, sunset eyes
- ▶ Vomiting, irritability, lethargy, ↑ BP, ↓ HR
- ▶ If VP shunt placed: assess for malfunction & infection
- ▶ Position with head of bed flat or per surgeon

GU/GI

Bladder & Bowel

- ▶ Clean intermittent catheterization (CIC) on schedule
- ▶ Crede maneuver if ordered (gentle suprapubic pressure)
- ▶ Monitor I&O; watch for UTI signs
- ▶ Bowel program — stool softeners, fiber, scheduled toileting
- ▶ Skin protection in insensate areas

07

PHARM TABLE • PREVENTION & MANAGEMENT

Pharmacology

DRUG / CLASS	MECHANISM	INDICATION	KEY SIDE EFFECTS	NURSING CONSIDERATIONS
Folic Acid vitamin B9	Essential cofactor for neural tube closure during embryogenesis	Prevention — 400 mcg/day all women of childbearing age; 4 mg/day if prior NTD	Generally well tolerated; large doses can mask B12 deficiency	Start at least 1 month before conception ; continue through first trimester minimum
Oxybutynin anticholinergic	Relaxes detrusor muscle; ↓ bladder spasms	Neurogenic bladder, urinary incontinence	Dry mouth, constipation, urinary retention, blurred vision, heat intolerance	Encourage fluids & sugarless candy; monitor bowel function; watch for overheating
Cefazolin / Cephalosporin antibiotic prophylaxis	Bactericidal — disrupts bacterial cell wall	Prevent CNS infection in exposed sac; perioperative prophylaxis	Diarrhea, rash, possible cross-reactivity with PCN allergy	Verify allergy history; monitor for C. difficile; ensure first dose given timely pre-op
Polyethylene Glycol osmotic laxative	Draws water into stool; softens passage	Chronic neurogenic constipation	Bloating, cramping, electrolyte shifts with high doses	Mix in liquid; encourage hydration; titrate to one soft stool daily
Acetazolamide carbonic anhydrase inhibitor	↓ CSF production	Temporary management of hydrocephalus (bridge to shunt)	Diuresis, paresthesia, metabolic acidosis, hypokalemia	Monitor electrolytes & daily weights; not a substitute for surgical decompression
Botulinum Toxin A intradetrusor injection	Blocks ACh release at detrusor neuromuscular junction	Refractory neurogenic detrusor overactivity	Transient urinary retention; rare systemic weakness	Patient must be willing to perform CIC if retention develops

08

WRONG VS RIGHT • COMMON CONFUSIONS

NCLEX Test Traps

△ **WRONG**

Place the newborn supine to assess vital signs and apply a dry sterile dressing to the sac.

✓ **RIGHT**

Prone position with a **sterile saline-moistened** non-adherent dressing — supine pressure can rupture the sac.

△ **WRONG**

Use latex gloves and standard latex equipment — latex precautions begin only after the first reaction.

✓ **RIGHT**

Latex-free environment from birth — repeated exposure during lifelong catheterizations and surgeries creates very high sensitization risk.

△ **WRONG**

Folic acid is used to treat existing spina bifida and reverse the defect after diagnosis.

✓ **RIGHT**

Folic acid is **prevention only**, started **before conception**. It cannot reverse an existing defect — once the neural tube has closed (~day 28), the timing has passed.

△ **WRONG**

Hydrocephalus is a rare unrelated complication and does not require routine monitoring.

✓ **RIGHT**

Hydrocephalus from Chiari II malformation affects **>80% of myelomeningocele infants** — daily head circumference and fontanel checks are mandatory.

△ **WRONG**

Diaper the infant normally over the defect to contain urine and stool.

✓ **RIGHT**

Do not diaper over the defect. Position to keep sac clean and free of urine/stool contamination — meningitis risk is the priority concern.

△ **WRONG**

A 4-year-old with myelomeningocele who develops constipation only needs increased fiber.

✓ **RIGHT**

Constipation is part of **neurogenic bowel** — a structured bowel program (timed toileting + softeners + fiber) is required, not diet alone.

09

FAMILY TEACHING • LIFESPAN

Patient & Family Education

Preconception (Prevention)

- ✓ 400 mcg folic acid daily — all women of childbearing age
- ✓ 4 mg daily if prior NTD pregnancy
- ✓ Start at least 1 month before conception
- ✓ Continue through first trimester
- ✓ Food sources: leafy greens, fortified cereals, beans, citrus

Latex Precautions

- ✓ Avoid balloons, rubber bands, certain pacifiers/nipples
- ✓ Tell every provider before any procedure
- ✓ Wear medical alert ID
- ✓ Know cross-reactive foods: banana, kiwi, avocado, chestnut
- ✓ Keep epinephrine auto-injector if prescribed

Clean Intermittent Catheterization

- ✓ Wash hands & supplies before each cath
- ✓ Use latex-free catheter and water-soluble lube
- ✓ Cath every 3–4 hours during day
- ✓ Watch for cloudy, foul urine, fever — UTI
- ✓ Keep a voiding/cathing log

Skin Integrity (Insensate Areas)

- ✓ Inspect skin twice daily — feet, buttocks, ankles
- ✓ Check shoes/braces for foreign objects
- ✓ Reposition every 2 hours if mobility impaired
- ✓ Pad bony prominences
- ✓ Report any redness, blisters, ulcers

Bowel Program

- ✓ High-fiber diet + adequate fluids
- ✓ Sit on toilet after meals (use gastrocolic reflex)
- ✓ Stool softeners on schedule, not PRN
- ✓ Suppositories or digital stim per plan
- ✓ Goal: 1 soft stool daily, no impaction

VP Shunt Awareness (if placed)

- ✓ Signs of malfunction: vomiting, headache, irritability, lethargy
- ✓ Signs of infection: fever, redness along shunt tract
- ✓ Avoid contact sports; helmet for biking
- ✓ Notify provider before any imaging or procedure
- ✓ Keep shunt info card accessible

Mobility & Development

- ✓ Range-of-motion exercises daily to prevent contractures
- ✓ Encourage age-appropriate independence
- ✓ Braces, walkers, wheelchairs as needed
- ✓ School plan: IEP or 504 accommodations
- ✓ Transition planning into adulthood

Psychosocial Support

- ✓ Connect with Spina Bifida Association
- ✓ Support groups for parents & children
- ✓ Address body image, sexuality at appropriate ages
- ✓ Genetic counseling for future pregnancies
- ✓ Watch for depression/anxiety — refer early

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MEMORY BOOSTERS • PATTERN RECOGNITION

Mnemonics

S P I N A

"SPINA" — Newborn Priorities

SAC CARE IN THE FIRST 24 HOURS

- S** terile saline dressing on sac
- P** rone position only
- I** ncreased ICP — watch for hydrocephalus
- N** o latex from birth
- A** ntibiotics + assess neuro function

O M M

"O-M-M" — Three Types in Severity Order

MILDEST → MOST SEVERE

- O** cculta — no sac, skin closed
- M** eningocele — sac + CSF, cord intact
- M** yelomeningocele — sac + CSF + cord (worst)

4 o o

"400 / 4000" — Folic Acid Doses

PREVENTION DOSING

- 400 mcg** daily — all women of childbearing age
- 4 mg (4000 mcg)** daily — prior NTD pregnancy
- Start **before** conception

B A K C

"BAKC" — Latex Cross-Reactive Foods

HIGH ALLERGY RISK IN SB PATIENTS

- B** anana
- A** vocado
- K** iwi
- C** hestnut

I C P

"ICP" — Hydrocephalus Signs in Infants

WATCH DAILY AFTER CLOSURE

- I** ncreased head circumference
- C** ry (high-pitched), bulging fontanel
- P** oor feeding, sunset eyes, vomiting

S K I N

"SKIN" — Occulta Cutaneous Cues

VISIBLE SIGNS OF HIDDEN DEFECT

- S** inus or dimple
- K** ink of hair (tuft)
- I** rregular pigmentation (port-wine)
- N**odule (lipoma)

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CLINICAL JUDGMENT • NGN-STYLE

NCJMM Six-Step Scenario

SCENARIO: A term newborn delivered 30 minutes ago has a 4 cm sac on the lumbosacral spine containing visible neural tissue. Head circumference is 36.5 cm (95th percentile). Anterior fontanel is soft and flat. Spontaneous lower extremity movement is minimal. Anal wink is absent. Mother received no prenatal care; she reports daily hot tub use during early pregnancy. Vital signs: HR 148, RR 52, T 36.6°C axillary, SpO₂ 97% room air. The infant is currently lying supine on the warmer with a dry gauze covering the sac.

Step 1 • Recognize Cues

What stands out?

Visible sac with neural tissue → **myelomeningocele**. Head circumference at 95th percentile — baseline concern for evolving hydrocephalus. Absent anal wink + minimal LE movement → neurogenic deficits below defect. **Sac is uncovered correctly and infant is in the wrong position.** Maternal hyperthermia exposure aligns with NTD risk.

Step 2 • Analyze Cues

What do they mean together?

Sac exposure + supine position + dry gauze = imminent risk of rupture, infection (meningitis), and tissue dryness. Large head circumference + Chiari II association = high probability of hydrocephalus developing. Neurogenic bowel/bladder already evident. Latex exposure must be avoided **before** any procedures begin.

Step 3 • Prioritize Hypotheses

What is most urgent?

1st: Sac integrity / infection prevention — the open neural tissue is immediately at risk. **2nd: Neurologic deterioration / hydrocephalus** — baseline monitoring must start now. **3rd: Family support & surgical preparation.** Latex avoidance threads through all priorities.

Step 4 • Generate Solutions

What actions are needed?

Reposition to **prone** immediately. Replace dry gauze with **sterile saline-moistened non-adherent dressing**. Convert care environment to **latex-free**. Establish baseline head circumference, palpate fontanels, document motor/sensory assessment, place on cardiorespiratory monitor. Begin NPO for surgery, IV access, antibiotic prophylaxis, notify pediatric neurosurgery, support parents.

Step 5 • Take Action

Implement in order

Don latex-free gloves → reposition prone with sac elevated off surface → remove dry gauze and apply sterile saline-moistened dressing → measure & document head circumference → complete neuro exam → obtain IV access → administer ordered antibiotic → keep warmer at neutral thermal range → page neurosurgery → begin parent teaching.

Step 6 • Evaluate Outcomes

How do we know it worked?

Sac intact & moist with no drainage. Infant remains in prone or side-lying position. No latex products in room. Head circumference stable or trending appropriately. No signs of infection (afebrile, no redness, no irritability disproportionate to baseline). Parents verbalize understanding of latex avoidance and surgical timing. Surgical closure completed within 72 hours.

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AT-A-GLANCE • EXAM DAY

Quick Reference Summary

POSITION

Prone

DRESSING

Sterile + Saline-moist

ENVIRONMENT

**Latex-free
from Birth**

PREVENTION

**400 mcg
Folic Acid**

HIGH-RISK DOSE

**4 mg
Folic Acid**

WATCH FOR

**Hydrocephalus
(>80%)**

SURGERY

**Within
24-72 hours**

MOST SEVERE TYPE

**Myelo-
meningocele**

CROSS-REACTIVE FOODS

**Banana • Kiwi
Avocado • Chestnut**