DIANE'S NGN NCLEX 2026 VISUAL STUDY LIBRARY

Hydrocephalus

CSF accumulation within the cerebral ventricles — a neurological emergency demanding ICP vigilance, surgical readiness, and family-centered education across the lifespan.

NEUROLOGICAL | PEDIATRIC · ADULT | INCREASED ICP RISK

Source note: Hydrocephalus is not currently in your uploaded reference notes. Content below is sourced from standard NGN NCLEX 2026 references including Saunders Comprehensive Review (2026), ATI Nursing Pediatrics & Adult Health, Lippincott Manual of Nursing Practice, and current AANN/AANS clinical guidelines.

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SECTION 01

Definition & Overview

Hydrocephalus is an **abnormal accumulation of cerebrospinal fluid (CSF)** within the ventricular system of the brain, producing **ventricular dilation and increased intracranial pressure (ICP)**.

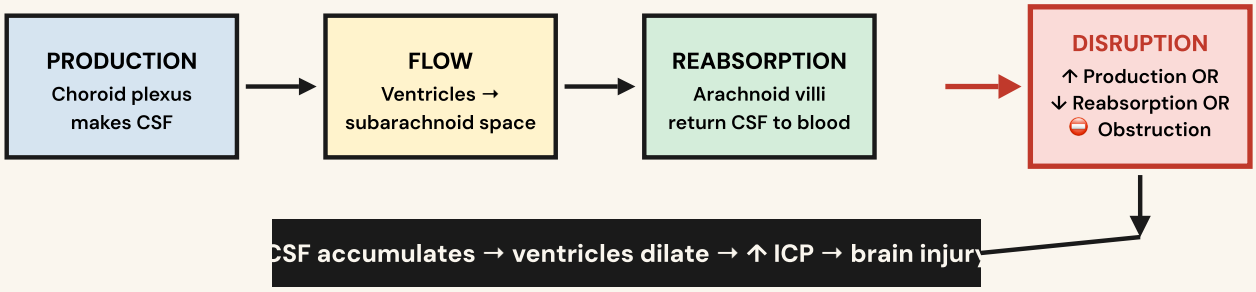
- **Why it matters:** Untreated rising ICP compresses brain tissue, compromises cerebral perfusion, and can cause permanent neurologic damage or death.
- **Lifespan reach:** Affects infants (congenital — incidence ~1 in 1,000 live births), children (post-infectious or post-traumatic), and adults (Normal Pressure Hydrocephalus in the elderly).
- **Definitive treatment:** Almost always **surgical** — most commonly a ventriculoperitoneal (VP) shunt.

SECTION 02

2 Pathophysiology

CSF is normally **produced** by the choroid plexus, **circulates** through the ventricles and subarachnoid space, and is **reabsorbed** by the arachnoid villi. Hydrocephalus arises when this balance fails.

The CSF Cycle & Where It Breaks Down



CSF PRODUCTION · FLOW · REABSORPTION — AND THE THREE FAILURE POINTS

Communicating (Non-obstructive)

CSF flows freely through ventricles but **cannot be reabsorbed** at the arachnoid villi. Causes: post-meningitis, post-subarachnoid hemorrhage, congenital absorption defects.

Non-communicating (Obstructive)

A **physical blockage** stops CSF flow between ventricles. Causes: aqueductal stenosis, brain tumor, Chiari malformation, intraventricular hemorrhage clot.

SECTION 03

3 Causes & Risk Factors

Congenital

- Aqueductal stenosis (most common)
- Myelomeningocele / spina bifida
- Chiari II malformation
- Dandy-Walker syndrome
- Intrauterine infection (TORCH)

Acquired (Peds)

- Intraventricular hemorrhage (premature infants)
- Bacterial meningitis
- Head trauma
- Brain tumor
- Post-neurosurgical complication

Adult / Elderly

- Normal Pressure Hydrocephalus (NPH)
- Subarachnoid hemorrhage
- Brain tumor
- Traumatic brain injury
- Idiopathic

SECTION 04

4 Signs & Symptoms

Presentation depends on **whether cranial sutures are open**. In infants the head expands; in older children and adults, the rigid skull forces ICP up sharply.

INFANT (Sutures Open)

- **↑ Head circumference** — hallmark early sign; measure daily
- **Bulging, tense anterior fontanel** (non-pulsatile)
- **Separated cranial sutures**
- **"Sunset eyes"** — sclera visible above iris (downward gaze)
- **High-pitched, shrill cry**
- Frontal bossing; distended scalp veins
- Macewen sign — "cracked-pot" sound on percussion
- Poor feeding, vomiting, irritability, lethargy

CHILD / ADULT (Sutures Closed)

- **Headache** — worse on waking; eases when upright
- **Projectile vomiting** often *without* preceding nausea
- Diplopia, blurred vision, **papilledema**
- Lethargy → confusion → ↓ LOC
- Personality / behavior changes; declining school work
- Ataxia, balance disturbance
- Seizures
- Cranial nerve VI palsy (lateral gaze deficit)

NORMAL PRESSURE HYDROCEPHALUS (NPH) — Classic Elderly Triad

- **Wet** — urinary incontinence
- **Wacky** — dementia / cognitive decline
- **Wobbly** — magnetic, shuffling, ataxic gait

Frequently misdiagnosed as Alzheimer's or Parkinson's — but NPH is potentially reversible with shunting.

RED FLAG — CUSHING'S TRIAD (LATE, PRE-HERNIATION)

Hypertension with widening pulse pressure · Bradycardia · Irregular respirations (Cheyne-Stokes). Add: fixed/dilated pupils, decerebrate or decorticate posturing, profound ↓ LOC.

THIS IS AN EMERGENCY — ESCALATE IMMEDIATELY.

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SECTION 05

Diagnostics

- **Serial head circumference (OFC):** Plotted on growth chart; the single most important pediatric screening measure. Crossing percentile lines is a red flag.
- **Head ultrasound:** Imaging of choice in infants — performed through the open anterior fontanel; bedside, no radiation, no sedation.
- **CT scan:** Rapid evaluation of ventricle size and acute changes; preferred in emergencies.
- **MRI:** Gold standard for detailed anatomy, identifying obstruction site, and confirming Chiari/Dandy-Walker.
- **ICP monitoring:** Invasive intraventricular catheter (also therapeutic — can drain CSF).
- **Lumbar puncture:** Performed only in *communicating* hydrocephalus. **Contraindicated in obstructive** hydrocephalus — risk of brain herniation.

SECTION 06

6 Priority Nursing Interventions

Use the **ABC + ICP framework.** The goal is to prevent rises in ICP and recognize neurological deterioration before herniation.

A
AIRWAY

Assess patency, respiratory rate & pattern. Monitor for apnea, irregular respirations, Cheyne-Stokes. Suction *gently* — coughing/gagging ↑ ICP.

B
BREATHING

Maintain oxygenation (SpO_2 ≥ 95%). Hypoxia and hypercapnia worsen cerebral edema. Avoid hyperventilation unless ordered for acute ICP crisis.

C
CIRCULATION

Watch for Cushing's triad. Maintain adequate MAP to preserve cerebral perfusion. Avoid aggressive fluid boluses unless ordered.

ICP-Lowering Care

- **Elevate HOB 30°** — promotes venous CSF drainage
- **Keep head midline** — neutral neck position; no flexion or rotation (prevents jugular obstruction)
- Cluster nursing care; minimize stimulation
- Quiet, dimly lit environment
- Avoid restraints (struggling ↑ ICP)
- Prevent Valsalva: stool softeners, no straining, no breath-holding
- Manage pain & fever aggressively (both ↑ ICP)

Infant-Specific Care

- **Measure head circumference daily**, same time, same tape, just above the eyebrows
- Palpate fontanels & sutures every shift
- **Support the head** at all times when lifting or positioning
- Reposition every 2 h — large head → skin breakdown risk
- Small, frequent feedings with frequent burping; **HOB up after feeds** to prevent aspiration
- Provide a sheepskin or pressure-relief mattress

Post-Op VP Shunt Care — High-Yield

- **Position on the UNoperated side** — prevents pressure on the shunt valve
- **Keep flat or HOB ≤ 30°** initially (per surgeon) — prevents rapid CSF drainage and subdural hematoma
- **Do NOT pump the shunt** unless specifically ordered by the neurosurgeon
- Monitor incision: redness, swelling, drainage, CSF leak
- Track head circumference; watch fontanels (a sunken fontanel suggests over-drainage)
- Strict I&O; small frequent feedings as tolerated

- Watch for shunt infection: fever, irritability, poor feeding, redness along shunt tract (typically 1–2 months post-op)
- Watch for shunt malfunction: return of ↑ ICP signs — vomiting, headache, lethargy, bulging fontanel

SECTION 07

7 Pharmacology

Medications are **temporizing only** — hydrocephalus is treated definitively by surgery. Drugs reduce CSF production or manage acute ICP elevation.

Drug / Class	Mechanism	Key Side Effects	Nursing Considerations
Acetazolamide (Diamox) *Carbonic anhydrase inhibitor*	↓ CSF production by choroid plexus	Metabolic acidosis, hypokalemia, paresthesia, drowsiness, kidney stones	Monitor electrolytes & ABGs; encourage fluids; sulfa allergy contraindication
Furosemide (Lasix) *Loop diuretic*	↓ CSF production; reduces extracellular fluid	Hypokalemia, hyponatremia, dehydration, ototoxicity	Monitor K^+ & daily weights; assess hearing with high doses; strict I&O
Mannitol *Osmotic diuretic*	Pulls fluid from brain tissue into vasculature — for *acute* ICP crisis	Pulmonary edema, electrolyte imbalance, rebound ICP, crystallization	**Always use in-line filter**; monitor serum osmolality (target 310–320); central line preferred; check for crystals before giving
Antibiotics (broad-spectrum, e.g., vancomycin + cefepime)	Treat shunt infection or causative meningitis	Nephrotoxicity, ototoxicity, "red man syndrome" with rapid vancomycin	Trough levels; infuse vancomycin over ≥ 60 min; monitor renal function
Antiepileptics (levetiracetam, phenytoin)	Prevent / treat seizures from cortical irritation	Drowsiness, gingival hyperplasia (phenytoin), behavioral changes (levetiracetam)	Monitor drug levels; phenytoin therapeutic 10–20 mcg/mL; never mix phenytoin with dextrose
Stool softeners (docusate)	Prevent Valsalva-induced ICP spikes	Mild GI upset	Routine for any client at risk of ↑ ICP

SECTION 08

8 NCLEX Test Traps ⚠️

WRONG	Positioning a post-op VP shunt infant on the **operated side** "to keep the shunt down."
RIGHT	Position on the **UNoperated side** — pressure on the new valve causes malfunction or skin breakdown.
WRONG	Elevating HOB high (60–90°) post-VP shunt to "drain better."
RIGHT	Keep flat or HOB ≤ 30° per surgeon — **rapid drainage causes subdural hematoma**.
WRONG	Treating a **bulging fontanel** as a normal finding.
RIGHT	A bulging, tense, non-pulsatile fontanel = **↑ ICP**. A sunken fontanel = dehydration *or* shunt over-drainage. Both are abnormal.
WRONG	Pumping the shunt to "check if it's working."
RIGHT	Do **NOT pump the shunt** unless specifically ordered by the neurosurgeon. Damage to valve or brain tissue can occur.
WRONG	Waiting to act because vital signs "look stable" — BP up, HR down.
RIGHT	Hypertension + bradycardia + irregular respirations = **Cushing's triad — LATE sign of impending herniation**. Notify provider STAT.
WRONG	Performing a lumbar puncture on a child with obstructive hydrocephalus and ↑ ICP.
RIGHT	LP is **contraindicated in obstructive hydrocephalus** — sudden CSF withdrawal causes **brain herniation**.
WRONG	Comforting a crying infant with hydrocephalus by handling head firmly or shaking the bassinet.
RIGHT	**Support the head at all times**; minimize stimulation; cluster care; quiet, dim environment to prevent ICP spikes.

SECTION 09

9 Patient & Family Education

Recognize Shunt Malfunction

- Vomiting, headache, irritability
- Bulging fontanel; ↑ head size (infants)
- Personality change; declining school performance
- Drowsiness or seizures
- **Any of these → call provider immediately**

Recognize Shunt Infection

- Fever, poor feeding, lethargy
- Redness or swelling along shunt tract
- Stiff neck, photophobia
- Most commonly appears 1–2 months post-op
- **Requires IV antibiotics and possible shunt revision**

Day-to-Day Living

- Avoid contact sports (football, wrestling, hockey)
- Helmet required for biking, scootering, skating
- Wear a medical alert bracelet
- Carry a shunt card listing valve type and surgeon
- Notify TSA / MRI staff before scans
- Keep immunizations current

Long-Term Expectations

- **Shunts require revisions** as the child grows
- Lifetime neurology & neurosurgery follow-up
- Developmental screening; possible early-intervention services
- Genetic counseling if congenital cause
- Family support groups (Hydrocephalus Association)

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SECTION 10

Memory Mnemonics

3 W's

Normal Pressure Hydrocephalus

Wet (urinary incontinence) · **Wacky** (dementia) · **Wobbly** (ataxic gait) — the elderly NPH triad.

SUN

Infant ICP Trio

Sunset eyes · **U**p-sized head circumference · **N**oisy, high-pitched cry — infant hydrocephalus picture.

↑ ↓ ↻

Cushing's Triad

↑ **BP** (widening pulse pressure) · ↓ **HR** (bradycardia) · ↻ **Respirations** (irregular / Cheyne-Stokes). LATE sign — act NOW.

VP

"V"erify "P"osition Post-Shunt

Place on the **UNoperated side**; keep **flat or low HOB**; **never pump** the shunt. (Memory: V-P starts with the *unaffected* letters.)

ICP

"I" Can Prevent (ICP Spikes)

Isolation from stimulation · **C**luster care · **P**osition HOB 30° & midline. Avoid suctioning, straining, coughing.

VOMIT

Hydrocephalus Pediatric Red Flags

Vomiting (projectile) · **O**cular signs (sunset eyes) · **M**orning headache · **I**rritability · **T**ense fontanel

SECTION 11 — NEXT GENERATION CLINICAL JUDGMENT MEASUREMENT MODEL

11 NCJMM Clinical Judgment Scenario

SCENARIO

A 4-month-old infant is brought to the ED by parents. They report the baby has been "fussier than usual," is feeding poorly, and vomited twice today without nausea. On assessment, the infant's **head circumference has increased 4 cm in 2 weeks**, *the anterior fontanel is* **bulging and tense**, *you note* **"sunset eyes"**, *and the cry sounds high-pitched and shrill. Vital signs: HR 102, BP 78/50, RR 32, T 37.0 °C, SpO_2 98 % on room air.*

1 Recognize Cues

Relevant cues identified: rapid head growth (4 cm/2 wk — far exceeds expected ~0.5 cm/wk), bulging/tense fontanel, sunset eyes, high-pitched cry, poor feeding, vomiting without nausea, irritability. Vital signs currently within normal limits — **note that Cushing's triad is NOT yet present**, but the constellation strongly suggests rising ICP.

2 Analyze Cues

Each finding maps to **increased intracranial pressure from CSF accumulation**. Open fontanel and sutures permit visible expansion; downward gaze (sunset eyes) reflects pressure on midbrain/CN III; high-pitched cry is the classic neurologic cry of ↑ ICP; vomiting without nausea reflects direct medullary irritation. The trajectory is dangerous — without intervention the infant will deteriorate toward Cushing's triad and herniation.

3 Prioritize Hypotheses

Priority hypothesis: Hydrocephalus with increasing ICP. Differential considerations: meningitis (would expect fever, nuchal rigidity), shaken baby syndrome / non-accidental trauma (retinal hemorrhages, bruising), intraventricular hemorrhage (more common in preemies). Hydrocephalus is the highest-priority working diagnosis based on the cluster of head-growth and ICP findings.

4 Generate Solutions

Anticipated interventions: **urgent head ultrasound or CT**; neurosurgery consult; NPO status in anticipation of OR; IV access (peripheral, large-bore not required); baseline labs (CBC, BMP, type & cross); prepare family for likely **VP shunt placement**. Begin ICP-precaution nursing care immediately. Provide developmentally-appropriate family support.

5 Take Action

Place infant with **HOB elevated 30°, head midline**; minimize handling; cluster care in quiet, dim room. Maintain NPO. Obtain & document **daily head circumference** at same landmark, same tape. Assess fontanels and neuro status every

2 hours including pupil response, LOC, and cry quality. Monitor vitals continuously — alert provider for HR < 100 with rising BP, or any change in respiratory pattern. Support parents; explain shunt procedure in simple terms.

6 Evaluate Outcomes

Expected outcomes post-shunt: head circumference growth returns to expected curve; fontanel becomes soft and flat; sunset eyes resolve; cry normalizes; infant feeds well and is appropriately responsive; no signs of shunt infection (no fever, redness along tract, irritability) or malfunction (no return of vomiting/headache/lethargy). Family verbalizes signs to report and demonstrates correct head-circumference measurement before discharge.

Diane's NGN NCLEX 2026 Visual Study Library · Hydrocephalus · Neurological System
Sources: Saunders Comprehensive Review for NCLEX-RN (2026 ed.) · ATI Nursing Care of Children & Adult Medical-Surgical · Lippincott Manual of Nursing Practice · AANN/AANS Clinical Guidelines · Hydrocephalus Association Patient Resources.