Pediatric Hydrocephalus Epidemiology

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The epidemiology of pediatric hydrocephalus involves the study of its occurrence, distribution, and determinants within the pediatric population. Here are some key points related to the epidemiology of pediatric hydrocephalus:

Prevalence: Hydrocephalus is a relatively common condition in pediatric neurosurgery. The prevalence can vary based on geographic location, access to healthcare, and the presence of risk factors. It is considered one of the most common congenital anomalies.

Congenital and Acquired Cases: Pediatric hydrocephalus can be congenital (present at birth) or acquired (developing after birth due to infections, tumors, trauma, etc.). The epidemiology may differ between congenital and acquired cases.

Incidence and Age Distribution: The incidence of pediatric hydrocephalus can vary across age groups. Congenital hydrocephalus is often diagnosed shortly after birth or during infancy, while acquired hydrocephalus can occur at any age.

Underlying Causes: The epidemiology of pediatric hydrocephalus is influenced by various underlying causes, including genetic factors, developmental anomalies, infections (such as meningitis), tumors, hemorrhages, and other conditions affecting the central nervous system.

Global Variations: Hydrocephalus can occur worldwide, but the prevalence and incidence rates may vary between regions. Access to healthcare, prenatal care, and the availability of diagnostic and treatment facilities can influence the epidemiological patterns.

Gender and Racial Differences: Some studies have explored potential gender and racial differences in the occurrence of hydrocephalus. However, these patterns can be complex and may vary based on specific populations and risk factors.

Advancements in Diagnosis: Advances in medical imaging and diagnostic techniques may influence the epidemiological landscape of pediatric hydrocephalus, allowing for earlier and more accurate diagnosis.

Treatment Outcomes: The epidemiology of pediatric hydrocephalus may also consider treatment

outcomes, including the success rates of surgical interventions such as shunt placement or endoscopic third ventriculostomy.

It's important to note that the epidemiological landscape of pediatric hydrocephalus is continually evolving as medical knowledge advances, and healthcare practices improve. Large-scale epidemiological studies, particularly those that involve diverse populations and long-term follow-up, contribute to a better understanding of the prevalence, incidence, and factors associated with pediatric hydrocephalus.

Pediatric hydrocephalus represents a high health care burden in the United States (US).

A study of Reynolds et al. aimed to be the first to describe pediatric hydrocephalus epidemiology and outcomes in Lusaka, Zambia.

This retrospective cohort study included patients < 18 years of age who underwent surgical hydrocephalus treatment at Beit CURE Hospital of Zambia, from August 2017 to May 2019. Surgeries included ventriculoperitoneal shunt insertions, revisions, and endoscopic third ventriculostomy (ETVs) with or without choroid plexus cauterization (CPC). A descriptive analysis of patient demographics, clinical presentation, and etiologies was summarized, followed by a multivariable analysis of mortality and 90-day complications.

A total of 378 patients met the inclusion criteria. The median age at first surgery was 5.5 (IQR 3.1, 12.7) months, and 51% of patients were female (n = 193). The most common presenting symptom was irritability (65%, n = 247), followed by oculomotor abnormalities (54%, n = 204). Postinfectious hydrocephalus was the predominant etiology (65%, n = 226/347), and 9% had a myelomeningocele (n = 32/347). It was the first hydrocephalus surgery for 87% (n = 309) and, of that group, 15% underwent ETV/CPC (n = 45). Severe hydrocephalus was common, with 42% ofhead circumferences more than 6 cm above the 97th percentile (n = 111). The median follow-up duration was 33 (IQR 4, 117) days. The complication rate was 20% (n = 76), with infection being most common (n = 29). Overall, 7% of the patients died (n = 26). Postoperative complication was significantly associated with mortality ($\chi2 = 81.2$, $p < 0.001$) with infections and CSF leaks showing the strongest association ($\chi2 = 14.6$ and 15.2, respectively, $p < 0.001$). On adjusted multivariable analysis, shunt revisions were more likely to have a complication than ETV/CPC or primary shunt insertions (OR 2.45 [95% CI 1.26-4.76], $p = 0.008$), and the presence of any postoperative complication was the only significant predictor of mortality (OR 42.9 [95% CI 12.3-149.1], $p < 0.001$).

Pediatric postinfectious hydrocephalus is the most common etiology of hydrocephalus in Lusaka, Zambia, which is similar to other countries in sub-Saharan Africa. Most children present late with neglected hydrocephalus. Shunt revision procedures are more prone to complication than ETV/CPC or primary shunt insertion, and postoperative complications represent a significant predictor of mortality in this population [1)].

In 2019, for the first time in a global model, the annual incidence of pediatric hydrocephalus was estimated. Low- and middle-income countries incur the greatest burden of disease, particularly those within the African and Latin American regions. Reliable incidence and burden figures for adult forms of hydrocephalus are absent in the literature and warrant specific investigation. A global effort to address hydrocephalus in regions with the greatest demand is imperative to reduce disease

incidence, morbidity, mortality, and disparities of access to treatment [2].

1)
Reynolds RA, Bhebhe A, Garcia RM, et al. Pediatric hydrocephalus outcomes in Lusaka, Zambia [published online ahead of print, 2020 Sep 11]. J Neurosurg Pediatr. 2020;1-12. doi:10.3171/2020.5.PEDS20193
2)
Dewan MC, Rattani A, Mekary R, Glancz LJ, Yunusa I, Baticulon RE, Fieggen G, Wellons JC, Park KB, Warf BC. Global hydrocephalus epidemiology and incidence: systematic review and meta-analysis. J Neurosurg. 2018 Apr 1:1-15. doi: 10.3171/2017.10.JNS17439. [Epub ahead of print] Review. PubMed PMID: 29701543.

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