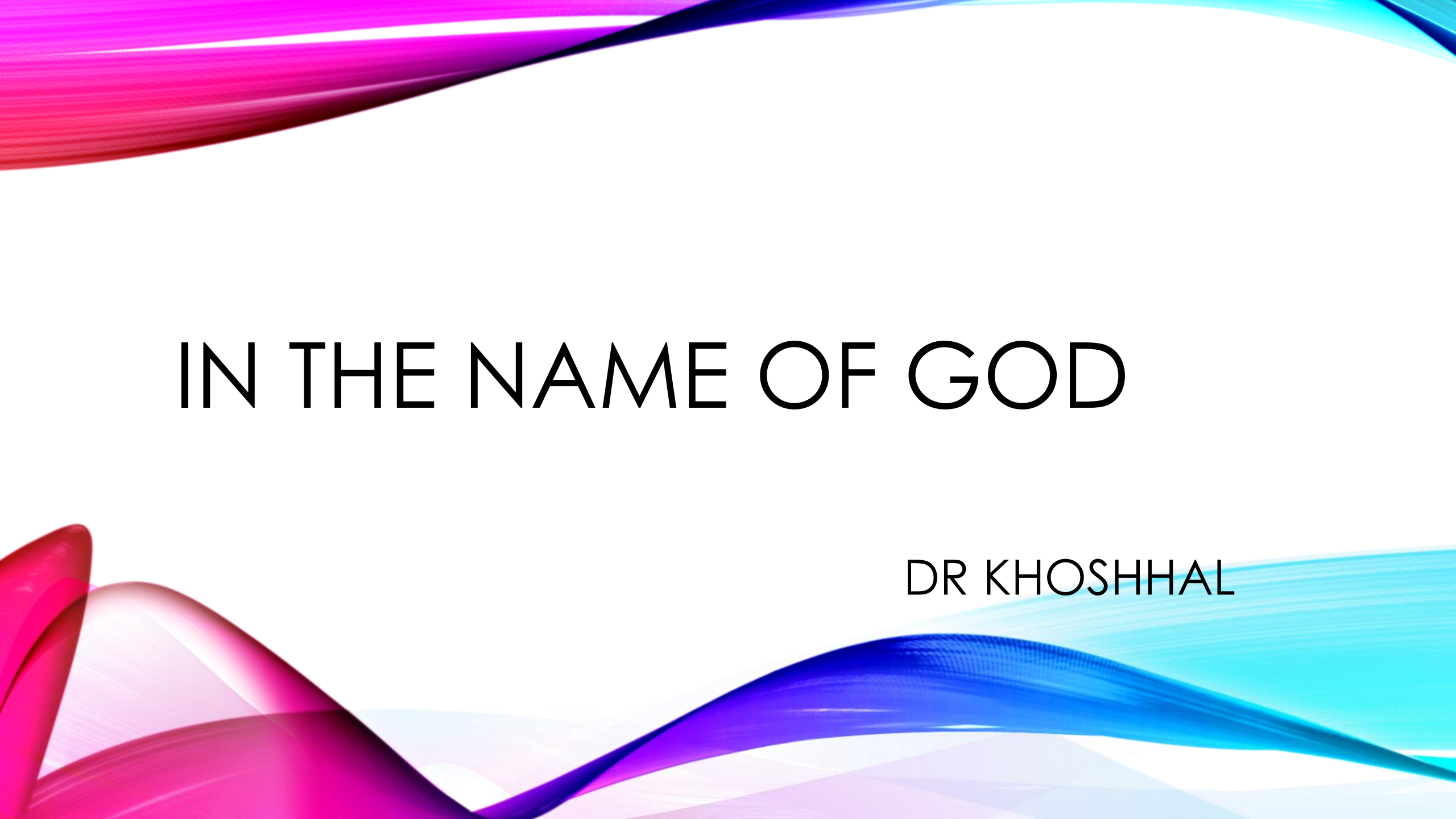




IN THE NAME OF GOD

DR KHOSHHAL



NEAR DROWNING

EPIDEMIOLOGY

- Compared with other types of injuries, drowning has one of the highest case fatality rates and is in the top-10 causes of death related to unintentional injuries for all pediatric age-groups.
- The highest drowning death rates were seen in children age 1-4 yr and 15-19 yr (crude rates of 2.56 and 1.2 per 100,000, respectively).

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- According to the **Utstein guidelines**, drowning refers to: "a process resulting in primary respiratory impairment from submersion or immersion in a liquid medium".
 - The Utstein guidelines further suggest that ambiguous or confusing terms such as "near-drowning," "secondary drowning," and "wet drowning" should not be used



RISK FACTORS

- •Inadequate adult supervision.
- •Inability to swim or overestimation of swimming capabilities.
- •Risk-taking behavior.
- •Use of alcohol and illicit drugs (more than 50 percent of adolescent drowning deaths are believed to be alcohol-related).
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CARDIAC ARRHYTHMIA & DROWNING

- Undetected primary cardiac arrhythmia (may be a more common cause of drowning than generally appreciated)
- . As an example, cold water immersion and exercise can cause fatal arrhythmias in patients with the congenital long QT syndrome type 1.
- Similarly, mutations in the cardiac ryanodine receptor (RyR)-2 gene, which is associated with familial polymorphic VT in the absence of structural

DROWNING & CEREBRAL HYPOXIA

- Hyperventilation prior to a shallow dive. Swimmers commonly hyperventilate in order to prolong the duration of underwater swimming, and by so doing they reduce the arterial partial pressure of carbon dioxide (PaCO_2) while the content of oxygen (CaO_2) does not increase appreciably.
- As the individual swims, oxygen is consumed and the partial

PATHOPHYSIOLOGY

- . **Vocalization** is precluded by efforts to achieve maximal lung volume to keep the head above the water or by aspiration leading to **laryngospasm** .
- Young children can struggle for only **10-20 sec and adolescents for 30-60 sec before final submersion.**
- A swimmer in distress is vertical in the water, pumping the arms up and down.

NEUROLOGIC COMPLICATION

- Hypoxemia and ischemia cause neuronal damage, which can produce cerebral edema and elevations in intracranial pressure
- . Some authors consider the progressive rise in intracranial pressure that is sometimes observed approximately 24 hours after injury to reflect the severity of the neurologic insult rather than its cause
- Approximately 20 percent of nonfatal drowning victims sustain neurologic damage, limiting functional recovery despite successful cardiopulmonary resuscitation

