Group A Strep (GAS)

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The Group A Streptococcus (GAS) bacteria 

The Group A Streptococcus (GAS) bacteria is a large group of gram-positive, non-motile, non-sporing cocci. 120 different strains, most common bacterial pathogen. Easily treated with antibiotics, but resistant. Responsible for more than 700 million infections worldwide annually, half a million deaths each year (Emert et al., 2015). Untreated, can spread, become systemic and devastating.

Major health concern: GAS among the top 10 infectious disease killers worldwide (Walker et al., 2014, p. 188).

The spectrum of diseases caused by GAS infections include those caused by beta-hemolytic and non-hemolytic (Khan, 2016).

Virulence Factors

• The most common forms: extracellular components, highly virulent, important in disease transmission.

• Major virulence factors: cell wall complex, chemically diverse.

• Structures resemble host C5A peptidase.

• GAS: Group A Streptococcal pharyngitis costs of at least $500 million annually (Steer et al., 2016).

• Opacity Factors (Khan, 2016).

• Escapes recognition by host immune system.

• Streptolysin S.

• Peptidoglycan, crucial for GAS survival.

• Annual death toll 500,000 worldwide (Khan, 2016).

• Streptococcal pyrogenic exotoxins.

• In U.S. GAS revealed a cost of $500 million annually (Khan, 2016).

• Nasal discharge.

• 18.1 million cases of pharyngitis, GAS pharyngitis cost of about $300 million annually in U.S. alone (Steer et al., 2016).

• Lethality 10-30%.

• Annual death toll 500,000-650,000 (Taras, 2012).

Pathophysiology

Pathophysiology and Significance of Pathophysiology

S pyogenes colonization, usually in upper respiratory tract, and is highly virulent as it overcomes the host defense system. Cell wall complex and chemically diverse.

Antigenic components of GAS are the virulence factors. Extracellular components responsible for disease process include invasins and exotoxins.

Hyaluronic acid outer capsule escapes recognition by host. Bacterium escapes phagocytosis by neutrophils or macrophages, allowing colonization.

Etiology:

• Highly communicable through person-to-person transmission.

• Respiratory droplets.

• Salivary droplets.

• Nasal discharge.

• Skin to skin spread known to occur with specific strains.

• Fingernails and perianal region can harbor streptococci causing impetigo.

• Food and waterborne outbreaks have been documented (Khan, 2016).

• Causes disease in healthy people of all ages.

• Deficiency in specific type of immunity against serotype responsible for infection (Khan, 2016).

• Impetigo and pharyngitis more likely to occur among children living in crowded homes or suboptimal hygienic conditions (Khan, 2016).

• Bacteria can live on dry surfaces outside the body for 3 days to 6 months (Whitehan, 2013).

• Disease/Signs & Symptoms:

Pharyngitis

Signs and symptoms include sore throat, fever, swollen lymph nodes, chills, malaise, muscle aches, erythematous, red and patchy rashes in the throat. Most signs and symptoms subside after 3 to 4 days, but antibiotics treatment should be started within 9 days of appearance of pharyngeal exanthem (APHS) development.

Nursing Care: Prevent and prepare administered antibiotics, antiseptics. Educate patient/family on proper use of antibiotics to prevent misuse. Encourage wash strong gels, and use of common antiseptics. Indicate the patient/family on proper care use and make of new toothbrush 24 hours after beginning antibiotics. Educate patient and family on the benefit of a bath, soft food diet until pain subsides. Advise patient/family on increased fluid intake to 2,000-3,000 ml/day where appropriate. Encourage patient to wear a disposable mask when exposed to environmental and occupational pollutants. Assess and test families for intra-family spread of bacterial infection (Erbol, 2015).

Impetigo/Pyoderma

Signs and symptoms include areas of acne or rash, small patches of inflamed skin, skin infections, oozing, honey colored crust and scales, hair loss, scratching, itching, and biting areas of infection, and depression.

Nursing Care: Teach proper washing and care of wounds. Educate patient/ family on proper use of antibiotics, both oral and topical. Educate on infection control and contagiousness of disease. Contact precautions should be initiated. Patient should be washed/disinfected separate from other family members. Teach good handwashing. Encourage patient to avoid immigrants and pollution so additional bacteria and pathogens can be avoided and wound infection subsides. Keep fingernails cut short (Antipont, 2011).

Invasive Infection

Signs and symptoms include fever, severe pain, swelling, and redness at wound site. More extreme signs such as chills, myalgia, nausea, vomiting, and diarrhea may develop as disease/infection progresses. Changes in blood pressure may occur as disease may progress further.


Glomerulonephritis

Signs in GAS include blood, excess protein in urine, bubbling, foamy urine from presence of high blood pressure, protein, blood in urine, perineal, facial edema, frequent night time urination, abdominal pain, and frequent nocturia.

Nursing Care: Provide bed rest during acute phase. Monitor and regularly assess the patient’s vital signs. Monitor lab values. Allow and gradually resume normal activities slowly. Encourage moderate amount of exercise daily if physical condition permits. Monitor high blood pressure. Provide care and support of patient and family.

Infection of inhibition blockage and through infection source bound human FH and C4BP enables GAS infections to evade opsonization. (Emert et al., 2015)

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- Khan, Z., Carapetis, J.R., Dale, J., Fraser, J., Good, M., Guillaume, L., Moreland, N., ... Nizet, V. (2015). Status of GAS vaccines for prevention of GAS infections if caught and identified quickly. The effective practitioner needs to be knowledgeable about the presence of GAS infections and assess patients’ risk as appropriate. GAS infection by a healthy or group population is completely immune to GAS. Further research on a GAS vaccine would prove valuable, and once developed, the vaccine may help reduce some of the worldwide disease burden of this powerful pathogen.

Conclusion

GAS is a significant pathogen responsible for 700-1,663,000 new cases, 163,000 deaths each year (Emert et al., 2015). Quick identification of GAS is paramount to control, arrest the disease process, prevent its spread, and complications. It is important to prevent spread, as GAS can spread easily between humans with close contact; disease spread among public health officials is a concern. GAS is treated the most GAS infections if caught and identified quickly. The effective practitioner needs to be knowledgeable about the presence of GAS infections and assess patients’ risk as appropriate. GAS infection by a healthy or group population is completely immune to GAS. Further research on a GAS vaccine would prove valuable, and once developed, the vaccine may help reduce some of the worldwide disease burden of this powerful pathogen.