

SHIGELLA

Bacteriology	Gram-negative rods; Enterobacteriaceae family;			
	4 major O antigenic groups: A- <i>S.dysenteriae</i> ; B- <i>S.flexneri</i> ; C- <i>S.boydii</i> ; D- <i>S.sonnei</i> ; in each group several serotypes in arabic numbers and lower case letters (ex: 2a); A = 12; B=14; C= 18; D=1			
Virulence	More virulent strains: <i>dysenteriae</i> 1 > <i>flexneri</i> > <i>sonnei</i>			
Hosts	Natural hosts: Only humans			
Source of Infection	[Stools] high = 100,000 - 100 million bacteria /gram; 10-100 organisms sufficient, enabling person-to-person transmission from symptomatic individual or short term post-recovery carrier Bacteremia uncommon			
Transmission	Fecal-oral route: person-to-person most frequent route , from fecal contamination and oral ingestion			
Food outbreaks	Common source outbreak: water or food; Food epidemics usually from infected foodhandlers + raw or handled after preparation Some foods involved: raw produce, including green onions, iceberg lettuce and uncooked baby maize			
Homosexuals Institutions	fecal-oral route, contaminated hands or sexual contact; 25% U.S. <i>S.flexneri</i> in young adult males from MSM transmission Mentally retarded, day care centers, army barracks, refugee camps; ships; <i>S.sonnei</i> common cause of diarrheal outbreaks in U.S. child care centers: incidence 6.6 /100 children /year with secondary cases in 25% of families			
Child Care Household	Index case usually asymptomatic child; spread occurs before recognition of index case; risk factor (# children ≤2 yrs or w diapers) Attack rate (household) = 40%			
Epi Pix				
Hi endemic	Prevalence (survey) = 5%-10% in children 2-5; Incidence (cohort studies)= 100-200% children /yr; 20% children 2+ attacks /year			
Lo endemic	Reported rates = 2-10 /100,000 /year			
Epidemic	large <i>S.dysenteriae</i> epidemics with high morbidity and mortality common before WW1; 1920: <i>S.flexneri</i> → most common; WW2: <i>S.sonnei</i> → most common ; <i>S.flexneri</i> predominant in developing world; 1970 <i>S.dysenteriae</i> ↑ as major cause of dysentery in Central America with epidemics in adults & children.			
Age Time	Low in infancy; more common among toddlers & young children; Epidemic all age groups; temperate countries peak = mid/late summer; tropical areas, peak = during/after heavy rainy season; Due to seasonal patterns of: social activities of children, water use for personal hygiene, water contamination, nutritional status			
Incubation	Usually 1-3 days, range 12 hours – 4 days; up to one week for <i>S.dysenteriae</i> 1			
Communicability	During acute infection; short term carrier after recovery (4 weeks);			
Carriers	Low countries: long term carrier rate low; 1-2% excrete the organisms for >3 months; High countries: carrier rate high among children: 20% excrete for ≥1 months, 10% for ≥2 months Tx reduces carriage			
Pathogenesis	Disease of the large intestine and distal small intestine; ulceration and colonic crypt abscesses			
Intra-cellular	able to penetrate cells; important for virulence; safer environment away from antibodies, complement & phagocytes; plasmid med infectious with doses as low as 10-200 bacteria ingested by mouth; infection person→person without enrichment thru water or food in vesicle bound by a membrane; cells survive invasion but eventually dies after bacterial multiplication			
Toxigenic	All Shigella produce cytotoxins; particularly virulent <i>S.dysenteriae</i> (80%) vs <i>S.flexneri</i> (20%); toxin causes –fluid secretion, apoptosis of intestinal epithelial cells, microulcer, inflammation, leukocytes exudation in lumen <i>S.dysenteriae</i> ⇒ neurotoxin → limb paralysis and death in rabbit or mouse. No role in human pathogenesis			
Definition				
Clinical Confirmed	An illness of variable severity characterized by diarrhea, fever, nausea, cramps and tenesmus. Asymptomatic infections may occur isolation of <i>Shigella</i> from a clinical specimen			
Probable	Clinically compatible case			
Suspect	Detection of <i>Shigella</i> using non-culture based method			
Clinical				
Asymptomatic	from low inoculum infections, preexisting immunity; asymptomatic rare in infants; common source outbreaks, attack rates range from 10 to 85% (mean 40%). Most clinical shigellosis = gastrointestinal disturbance : Watery diarrhea, abdominal pain, fever	Bacterial load	% with disease	
Symptomatic			<i>S.flexneri</i>	<i>S.dysenteriae</i>
Dysentery	frequent small volume bloody mucoid stools + abdominal cramps + tenesmus	100,000 10,000 200 10	58% 59% 22% 10%	83% 50% 10%
Prognosis	Well people: self limiting in ~7 days. Malnourished children → chronic relapsing disease w 10% fatality rate			
Reiter's Σ	Postdysenteric Reiter's Σ = oculo-urethro synovial sx; with <i>S.flexneri</i> & HLA –B27 antigen			
Complications	usually from <i>S.dysenteriae</i> : toxic megacolon, hemolytic uremic syndrome, toxic encephalopathy (Ekiri Sx)			
Immunity	acquired immunity to specific strains; in high countries immunity → lower incidence in adult; Introduction of new strain → epidemic among all age groups; experiments for live oral vaccines → serotype specific protection Breast fed neonates protected but not bottle fed			
Diagnosis				
Stool culture	Collect specimen early in the illness, before antibiotic Tx; 2-3 specimens on different days; Stools better than swabs; If swabs performed, go passed anal canal; best swabs from ulcer collected under endoscopy Selective media have dye which tags rapid lactose fermentors (Shigella are not rapid fermentors). Mac Conkey, Hektoen enteric, TTC media OK. SS media too inhibitory for Shigella, particularly <i>S.dysenteriae</i> Enteric culture mailer include vial of transport medium			
Non-culture Method	Can detect <i>Shigella</i> using non-culture based method such as PCR			
Treatment				
Fluid & electrolyte	Fluid and electrolyte replacement if diarrhea is abundant and dehydration apparent			
Antibiotics	shorten duration /severity of sx & duration of carriage; Duration 5 days; Fluoroquinolone : ciprofloxacin, norfloxacin Alternative antibiotics: ceftriaxone or cefixime or trimethoprim-sulfamethoxazole			
Antimotility	not recommended; may prolong illness; limit to 1 - 2 doses; Not administered with antibiotics			

SHIGELLA

PUBLIC HEALTH	
Case Management	See below
Food preparation	Educational programs for food handlers
Day Care centers	Educational programs
Dairy sanitation	Boiling & pasteurizing; safe storage
Water supply	
Fly control	
Surveillance	
	Report; Fill CDC Form; verify lab tests (particularly IgM positive and not IgG or total anti-HAV) Exposure Hx: Contact w diarrheal pt; travel outside US; close contact w baby /young child home /work; day care attendance employment in food svcs, health care or day care; outbreak
Exclusion	
	Day care, Food handler: exclude until one negative stool or fecal swab; not ≤48hrs after AB Tx stopped; Exclude symptomatic close contact of case until stool results available
Isolation Precaution	Contact (Enteric precaution)
Case Management	
	1-Obtain Hx; 2-Confirm Dx (Obtain proper lab samples); 3-Ensure proper Tx, disinfection and counseling; 4-Investigate source 5-Contact investigation; 6-Involve environmental health specialists; 7-Discuss confidentiality with staff
Source Investigation	Personal contact; MSM Sexual partner; Occupational exp at nursery, pre-school, daycare Collect stools for identification of mild cases or chronic carrier (not very productive); chiefly in food handling & day care
Contact Investigation	List household contacts + any other w significant exposure (food handler, day care, poor hygiene contact) Other cases in outbreak Collect stools from contacts when high risk of secondary transmission Exclude symptomatic close contact of case until stool results available
Food handler	Remove suspect until lab test result; Exclusion if confirmed; Contact food service sanitarian; Hygiene practices Work history (direct handling, type of food, raw or cooked, before /after cooking, dates and times →2 wks before onset)
Child care center	1-Compulsory report of case of Shigella by day care; 2-Obtain stools specimens a-from any symptomatic staff or attendee b-from all classmates if index age ≤3, c-from all if 2+ cases; 3-Exclude symptomatic (if cohorting undertaken, no exclusion); 4-Obtain Tx for cases; 5-Avoid closure since children may register at other day care → spread infection; 6-Inform other day care, ER & peds Chronic carrier may be re-admitted if toilet trained and hand washing practices monitored
Household Contact	Education; Household contacts not routinely evaluated.
Counseling	Importance of hand washing after defecation, before handling food Shigellosis fact sheet
Information	CDC Site: www.cdc.gov/ncidod/diseases/index.htm – Click on Shigellosis