


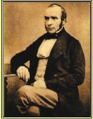

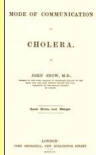



WATER- AND EXCRETA-RELATED COMMUNICABLE DISEASES

Part 1 of 5

<p>1.</p>	 <p style="text-align: center;">WATER- & EXCRETA-RELATED COMMUNICABLE DISEASES</p> <p style="text-align: center;">Professor Mara</p>	<p>This is a lecture on the water- and excreta-related communicable diseases, and we are going to develop a unitary environmental classification.</p>
<p>2.</p>	<p style="text-align: center;">Communicable diseases caused by pathogenic micro-organisms associated with water and/or excreta</p> <ul style="list-style-type: none"> ❖ viruses ❖ bacteria ❖ protozoa ❖ helminths 	<p>These communicable diseases are caused by pathogenic micro-organisms which are associated in one way or another with water and/or excreta, so we are talking about the viruses, bacteria, protozoa and helminths – helminths are worms.</p>
<p>3.</p>	<p style="text-align: center;">WATER- & EXCRETA-RELATED DISEASES</p> <p>Amoebic dysentery, Ascariasis, Bacillary dysentery, Balantidiasis, Cholera, Diarrhoeal disease, Enterobiasis, Enterovirus infections, Gastroenteritis, Giardiasis, Infectious hepatitis, Leptospirosis, Paratyphoid, Trichuriasis, Tularaemia, Typhoid, Conjunctivitis, Scabies, skin sepsis and ulcers, Tinea, Trachoma, Typhus, Yaws, Clonorchiasis, Diphylobothriasis, Guinea worm, Paragonimiasis, Schistosomiasis, Dengue, Filariasis, Malaria, Onchocerciasis, Trypanosomiasis, Yellow fever, Legionnaire's disease.....</p>	<p>This is a list of water- and excreta-related diseases, and you should recognise some old friends here like cholera and diarrhoea,</p>
<p>4.</p>	<p style="text-align: center;">WATER- & EXCRETA-RELATED DISEASES</p> <p>Amoebic dysentery, Ascariasis, Bacillary dysentery, Balantidiasis, Cholera, Diarrhoeal disease, Enterobiasis, Enterovirus infections, Gastroenteritis, Giardiasis, Infectious hepatitis, Leptospirosis, Paratyphoid, Trichuriasis, Tularaemia, Typhoid, Conjunctivitis, Scabies, skin sepsis and ulcers, Tinea, Trachoma, Typhus, Yaws, Clonorchiasis, Diphylobothriasis, Guinea worm, Paragonimiasis, Schistosomiasis, Dengue, Filariasis, Malaria, Onchocerciasis, Trypanosomiasis, Yellow fever, Legionnaire's disease.....</p> <p style="text-align: center; color: red; font-size: 2em; font-weight: bold;">NOT USEFUL!!</p>	<p>but actually such a list is not remotely useful,</p>

<p>5.</p>	<p><input type="checkbox"/> nor is a list by type of causative organism (ie, virus, bacterium, protozoon or worm)</p> <p><input type="checkbox"/> what is needed is: an environmental classification which groups the diseases into categories of common environmental transmission patterns</p>	<p>nor is a list which lists the causative organisms of these diseases by biological types – that is to say, whether they are viral diseases, bacterial diseases, protozoan diseases or worm diseases. What we as engineers need is an environmental classification which groups together the diseases into categories which have a common environmental transmission pattern;</p>
<p>6.</p>	<p>Unitary environmental classification of water- and excreta-related communicable diseases</p> <p>Seven categories:</p> <ol style="list-style-type: none"> 1. Faeco-oral waterborne & water-washed diseases 2. Non-faeco-oral water-washed diseases 3. Geohelminthiases 4. Taeniasis 5. Water-based diseases 6. Insect-vector diseases 7. Rodent-vector diseases 	<p>and in this unitary environmental classification of water and excreta related diseases we have seven categories, the first of which is the faeco-oral waterborne and water-washed diseases.</p>
<p>7.</p>	<p>1(a) Waterborne diseases</p> <p><input type="checkbox"/> Caused by excreted pathogens present in drinking water</p> <p><input type="checkbox"/> Transmission route:</p> <p style="text-align: center;"> excreta ↓ water ↓ mouth </p> 	<p>First we will look at the waterborne diseases. Here these diseases are caused by pathogens which are present in drinking water, so basically the transmission route is the excreta of one person into water and then that water being drunk by somebody else.</p>
<p>8.</p>	<p>Examples of diseases which can be waterborne:</p> <ul style="list-style-type: none"> ▪ typhoid ▪ cholera ▪ shigellosis ▪ enteroviral diseases ▪ giardiasis ▪ cryptosporidiosis 	<p>This is a list of examples of diseases which can be waterborne – and that word ‘can’ is very important. So we have typhoid, cholera, shigellosis, enteroviral diseases, giardiasis and cryptosporidiosis</p>
<p>9.</p>	<p>Cholera in England in the early-to-mid 1800s</p> <ul style="list-style-type: none"> ▪ Cholera was the first disease to be shown to be waterborne – by Dr John Snow in London in 1854 ▪ The Broad St pump: Snow removed the pump handle & the outbreak stopped   	<p>Cholera in England in the early-to-mid 1800s was the first disease to be shown to be waterborne, in fact by Dr John Snow in London in 1854. We have the famous Broad Street Pump incident where Snow removed the pump handle and the outbreak stopped, so it was claimed.</p>

<p>10.</p>	<p>So did removing the pump handle have any effect?</p> <p>Pump handle removed</p> <p>Number of cholera deaths</p> <p>August - September 1854</p>	<p>This slide shows Snow's results: the number of cholera deaths per day during late August to early September in 1854, and he removed the pump handle on 8 September; and you can see really that removing the pump handle had very little effect.</p>
<p>11.</p>	<p>The John Snow pub, Broadwick St, Soho, London</p>	<p>Broad Street is now called Broadwick Street and there is a pub there called the John Snow pub, in Soho in London.</p>
<p>12.</p>	<p>The World's Largest Waterborne Disease Outbreak – Milwaukee, Wisconsin, USA</p> <ul style="list-style-type: none"> ▪ March–April 1993 ▪ Filter malfunction at one of the city's water treatment works → cryptosporidiosis on a truly massive scale: ~403,000 people infected and ~70 people died (pop. of Greater Milwaukee: 1.6 m) ▪ Estimated total cost of outbreak: ~US\$ 100 millions 	<p>The world's largest outbreak of waterborne disease occurred in Milwaukee in Wisconsin in the United States in March to April 1993. This was caused by a filter malfunction at one of the city's water treatment works, and this led to an outbreak of cryptosporidiosis on a truly massive scale. Over 400,000 people were affected and about 70 people died; the population of Greater Milwaukee is 1.6 million, and the estimated cost of the outbreak was something of the order of US\$ 100 million.</p>
<p>13.</p>	<p>Guinea worm</p> <ul style="list-style-type: none"> • <i>Dracunculus medinensis</i>, the "fiery serpent" – an exclusively waterborne helminthic disease (properly called Dracunculiasis) • Life cycle: female worms (~1 m in length) form a blister in legs or feet; larvae shed from blister when in contact with water; larvae eaten by copepods in water; people infected by drinking water containing these copepods ... 	<p>Guinea worm is an example of a helminthic disease which is exclusively waterborne. It is often known as the 'fiery serpent' and it is properly called dracunculiasis. The female worms, which are about a metre in length, form a blister in the foot or legs, and larvae are shed from this blister when the blister comes in contact with water. The larvae get into the water, they are eaten by copepods and people become infected when they drink water containing these copepods.</p>
<p>14.</p>	<p>Unprotected polluted well – full of copepods</p>	<p>This slide shows a typical unprotected well somewhere in Africa. The water is very dirty and in fact it is full of copepods – the water fleas or <i>Cyclops</i>.</p>

<p>15.</p>	<p>Guinea worm control</p> <ul style="list-style-type: none"> • Narrow wall around well (narrow so people cannot stand on it) – prevents larvae getting into the water • Simple plastic mesh filter to remove the copepods prior to drinking <div data-bbox="379 383 796 481" style="border: 1px solid blue; padding: 5px;">  <p>The Fiery Serpent</p> </div>	<p>So how do we control guinea worm transmission? The best way is to build a narrow wall around the well. It has to be narrow so that people cannot stand on it, and this prevents the larvae from getting into the water. Alternatively, or in addition, the people can use a simple plastic mesh filter to remove the copepods prior to drinking the water.</p>
<p>16.</p>	<ul style="list-style-type: none"> • Waterborne diseases are obviously very important • But more important are water-washed diseases which form Category 1(b) 	<p>Obviously waterborne diseases are very, very important – but actually, and especially in developing countries, much more important are the water-washed diseases, which form Category 1b of our unitary environmental classification.</p>