

P11 Clinical microbiology II – examination in respiratory and GI infections

To study: Infections of various organs and organ systems (from textbooks, www etc.), sampling, specimen transport (from textbooks, www etc.)

From the spring term: Microscopy, culture, biochemical identification

Examination in respiratory tract infections

Task 1: Search for respiratory pathogens in clinical microbiology

Look at the picture, already filled in for the double practical. Use this picture in the Task 2 and Task 3.

disc containing bacitracin (in elevated concentration)

possible pathogen haemophilus

possible pathogens: meningococci (colourless), yeasts (white)

disc containing vancomycine and colistine

possible pathogen (tiny, colourless colonies, haemolysis) haemolytic streptococci

possible pathogen (something larger, white colonies, haemolysis) Staphyloc. aureus

Common pharyngeal flora consists mostly of

a) oral streptococci appearance: colourless or greyish, viridation

b) oral neisserias appearance: yellowish, no haemolysis or partial

line of S. aureus because of haemophili

Task 2: Examination in acute bronchopneumonia

For this casuistic, documented by the order form, try to examine the corresponding specimen (sputum), to find a possible pathogen, make a conclusion and interpret the result. Step by step, fill in the individual fields in “the screen of laboratory information system”.

Kód pojišťovny 1 1 1	požaduje dl A	IČP 7 2 1 2 3 4 5 6 Odbornost 7 8 9	Datum 1 5 1 2 0 8	Čís. dokladu	Poř. č.
POUKAZ NA VYŠETŘENÍ / OŠETŘENÍ					
Pacient Linda Green		Accute bronchopneumonia, 38.5 °C, heavy diabetes			
Č. pojištění *1932		Variabilní symbol			
Odeslán ad:		Kód náhrady			
Požadováno: sputum for bacteriological examination					
Poznámka:					
72 Dr. Michal Teplý 123 generální praktičtí lékař 456 Kompostová 8, Brno		Dne:			
razítko a podpis lékaře		razítko a podpis			
VZP-06/1999					

Patient: Linda Green *1932 Dg.: Pneumonia					
Specimen: Sputum			Ordered by: Dr. Microbe Terrible		
Bacterium A: description	Conclusion:	Interpretation	Microscopy result: Epithelial cells: _____ WBC-s _____ Bacteria (describe): _____		
Bacterium B: description	Conclusion:	Interpretation			
Bacterium C: description	Catalase	10 % NaCl			

Antibiotic susceptibility test (bacterium C)

Cefoxitin (FOX)*	R < 22 S ≥ 22		Co-trimoxazole (SXT)	R < 14 S ≥ 17	
Erythromycin (E)	R < 18 S ≥ 21		Tetracyclin** (TE)	R < 19 S ≥ 22	
Clindamycin (DA)	R < 19 S ≥ 22		Chloramfenicole (C)	R < 18 S ≥ 18	

write S = susceptible, R = resistant, eventually I = intermediary

*interpreted as oxacillin and other beta-lactams

**result of this test is also valid for doxycycline

Final conclusion and recommendation for treatment: _____

a) Microscopy of sputum

Look at the smear prepared from your specimen. Try to find the individual objects (bacteria, host cells). Fill in the field "Microscopy result":

+++ = more than 10 objects in the observation area

++ = less than 10 objects in the observation area

+ = only rare objects (one or less per an observation area)

0 = none

b) Description of bacteria

On the blood agar, describe the size, colour and haemolytic properties of the grown bacteria. Do not describe other characteristics. Take into account that there was no growth visible on Endo agar. Bacteria A and B should be bacteria considered to be parts of normal flora. Bacterium C will be a pathogenic bacterium that will be tested in detail in parts c) and d)

c) Further tests

Fill in the results of the catalase test, hyaluronidase test and of the growth on blood agar with 10 % NaCl for Bacterium C.

d) Antibiotic susceptibility

Fill in the antibiotic susceptibility test for Bacterium C. Always write down the name of the antibiotics and "S" or "R" (susceptible or resistant). Reference zones are written on your table.

e) Final conclusion

Try to formulate several words for the general practitioner. Especially try to find out (with the help of your teacher) which antibiotics would be the best choice.

Task 3: Examination in acute tonsillitis

Similarly as in the previous case, there is an order form. Try to examine the corresponding specimen (throat swab) to find a possible pathogen, make a conclusion and interpret the results. Step by step, fill in the individual fields in “the screen of laboratory information system”. The way of doing it is the same as in the previous task.

Kód pojišťovny 1 1 1	požaduje díl A	IČP 7 2 1 2 3 4 5 6 Odbornost 7 8 9	Datum 1 5 : 1 2 0 8	Čís. dokladu	Poř. č.
POUKAZ NA VYŠETŘENÍ / OŠETŘENÍ				provedl díl B	
Pacient	Martin Blue				
Č. pojištěnce	*1991	acute tonsillitis, 38.8 °C			
Variabilní symbol					
Odeslán ad:					
	Kód náhrady				
Požadováno:	throat swab for bacteriological examination				
Poznámka:					
72 123 456	Dr. Microbe Terrible generální praktička Compositive 8, Brno				
	razítko a podpis lékaře				
VZP-06x/1999					
	Dne:				
	razítko a podpis				

Patient: Martin Blue		*1991 Dg.: Accute tonsillitis	
Specimen: Throat swab		Ordered by: Dr. Microbe Terrible	
Bacterium A: description	Conclusion:	Interpretation	
Bacterium B: description	Conclusion:	Interpretation	
Bacterium C: description	Cata-lase	Bile-aesc.	PYR CAMP Conclusion: Interpretation

Antibiotic susceptibility tests (bacterium C)

Penicillin (P)	R < 18 S ≥ 18		Chloramfenicol (C)	R < 19 S ≥ 19	
Erythromycin (E)	R < 18 S ≥ 21		Tetracyklin* (TE)	R < 20 S ≥ 23	
Clindamycin (DA)	R < 17 S ≥ 27		Vancomycin (VA)	R < 13 S ≥ 13	

write S = susceptible, R = resistant, eventually I = intermediary

*interpreted as oxacillin and other beta-lactams

**result of this test is also valid for doxycycline

Final conclusion and recommendation for treatment: _____

Task 4: Suitable specimens for various respiratory infections

Using slideshow, find suitable way of examination for various clinical situations

Suspicion for	Type of specimen	Suspicion for	Type of specimen
rhinitis		bronchitis	
sinusitis		acute pneumonia (expectoration of pus)	
pharyngitis		subacute pneumonia (dry cough)	
influenza		lung aspergilosis	

Examination in gastrointestinal system

Task 5: Examination in acute diarrhoea

In this case, stool was sent to the laboratory. We have to know, that stool normally contains strictly anaerobic flora, but this cannot be found during normal examination, as normal examination is only aerobic. Even enterococci are only found in blood agar is used, and this is not part of routine examination of stool. On the other hand, members of *Enterobacteriaceae* family are often found in stool – both parts of normal flora (with some strains with elevated virulence, for example EPEC for *E. coli*) and obligatory pathogens (*Salmonella*). – The stool specimens are observed after 24 hours (direct result of Endo agar and XLD agar) and 48 hours (direct result of *Campylobacter* examination on CCDA agar and *Yersinia* examination on CIN agar, and subcultures from selenite broth on Endo agar and MAL agar). The 24 h examination was already performed in your case. Fill in results of 48 h examination and try to make a final conclusion.

Kód pojišťovny 1 1 1	peřaduje díl A	IČP 7 2 1 2 3 4 5 6 Odbornost 7 8 9 1 5 1 2 0 8	Datum	Čís. dokladu	provedl T B	Poř. č.
POUKAZ NA VYŠETŘENÍ / OŠETŘENÍ						
Pacient Cecilia Brown	Dg: Acute diarrhoea					
Č. pojištění *1983	Variabilní symbol					
Odeslán ad:	Kód náhrady					
Požadováno: Stool for bacteriological examination						
Poznámka:						
72 123 456	Dr. Michal Těmbl generální praktičer Čampositve 8, Brno		Dne:			
VZP-06x/1999		razítko a podpis		razítko a podpis		

Patient Cecilia Brown, *1984 Dg.: Accute diarrhoea					
Endo agar (24 h)	XLD agar (24 h)	Endo agar (subcultivation)	MAL agar (subcultivation)	CIN agar (48 h)	CCDA agar (48 h)
<i>E. coli</i>	negative			Final conclusion and interpretation	
More tests					
HAJNA medium					
Serotyping	Dental students do nto perform this part				

Task 6: Stool samples for different types of pathogens and toxins

For some purposes, it is possible to send rectal swabs, while for others, it is necessary to send a piece of stool, sometimes even refrigerated.

Watch the next table. For dental students it is already filled in.

Stool sent for	Type of specimen	Stool sent for	Type of specimen
bacteriology	<i>Anal/rectal swab (Amies)</i>	virology – virus isolation	<i>Nut-sized piece of stool (cooling necessary!)</i>
mycology	<i>Anal/rectal swab (Amies or FungiQuick)</i>	parasitology	<i>Nut-sized piece of stool (cooling not necessary)</i>
virology – antigen detection	<i>Nut-sized piece of stool (cooling not necessary)</i>	detection of the <i>Clostridium difficile</i> toxin	<i>Nut-sized piece of stool (cooling not necessary)</i>

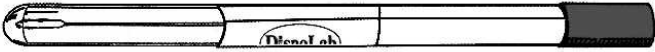
Task 1: Indications for microbiological examination

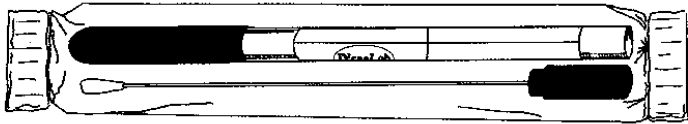
For following casuistries, fill in the table – for the double practical do it just together with your teacher.

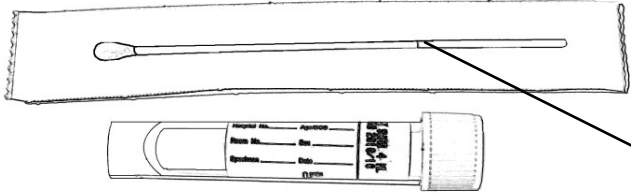
	Description of a case	Solution
a		
b		
c		
d		

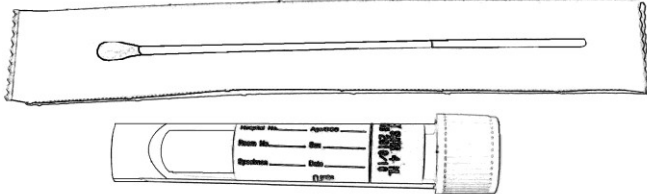
Task 2: Swabs and vessels

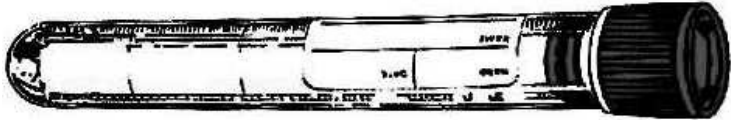
Observe the swabs in your table and fill in their “identity cards”.

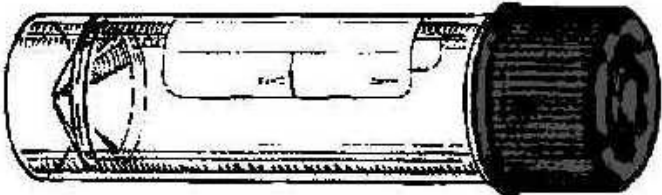
Name: Plain swab		
	Stick material	plastic, wood, aluminium
	Swab material	synthetic cotton
Practical use:		

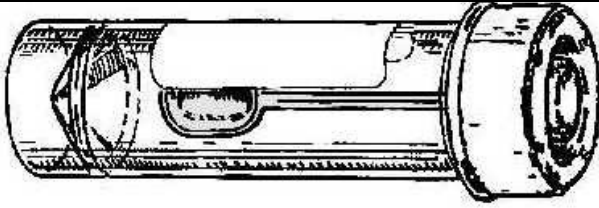
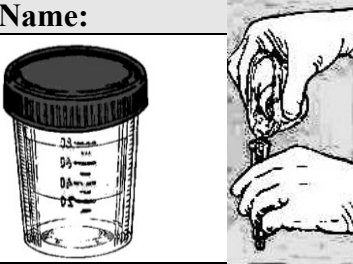
Name: Swab with Amies transport medium		
	Stick material	plastic or aluminium
	Swab material	synthetic cotton
	Medium	Amies (Stuart, Cary Blair)
<p><i>Note: The medium may contain charcoal (then it is black); without charcoal, it would be colourless.</i></p> <p>Practical use:</p> <p>Variant with aluminium stick is used for</p>		

Name: Fungi-Quick swab		
	Stick material	plastic
	Transport medium colour	colourless
	Cap colour	
<p>Practical use:</p>		

Name: C. A. T. swab		
	Stick material	plastic
	Transport medium colour	colourless
	Cap colour	
<p>Practical use:</p>		

Name: Common test tube for microbiology		
	Sterile? (yes or no)	
	Description	made of polystyrene, 16 × 100 mm, 10 ml
<p>Practical use:</p>		

Name: Sputum test tube		
	Sterile? (yes or no)	
	Description	made of polystyrene or polypropylene, 26 × 92 mm, 30 ml
<p>Practical use:</p>		

Name: Stool container			
	Sterile? (yes or no)		
	Description	made of polypropylene, 26 × 82 mm, 30 ml	
Practical use:			
Name: Sampling vessel for urine			
	Sterile? (yes or no)		
	Description	made of polypropylene, 45 × 70 mm, 120 ml	
Practical use:			

Task 3: Other sampling methods than swabs and vessels

Fill in the following table:

Sampling method	Typical example(s) of use
smear on a slide	<i>Fastidious microbes (gonococci, aktinomyces etc.)</i>
imprint with an agar	<i>Examination of skin focuses</i>
moulage method	<i>Examination of infections of areal wounds</i>
uricult	<i>Examination of urine (primocultivation possible at patient)</i>

Task 14: The order form

a) Filling in the order form

Fill in the following order form with a patient name and data and the requested examination related to the disease, according to a card that has been given to you by the teacher.

Kód pojišťovny	požaduje díl A	IČP	Datum	Čís. dokladu	Pof. č.
		Odbornost		provedl díl B	
POUKAZ NA VYŠETŘENÍ / OŠETŘENÍ					
Pacient					
Č. pojištěnce	Základní diagnóza				
Variabilní symbol	Ostatní diagnózy				
Odeslán ad:	Kód náhrady				
Požadováno:					
Poznámka:					
razítko a podpis lékaře	Dne:				
VZP-06x/1999	razítko a podpis				

b) Order form common mistakes

Oral students in the double practical session do not perform this task.

Task 15: Interpretation

a) Direct diagnostic interpretation

Using the table in the slideshow, write likely interpretation for first five of thirteen various findings written on cards available on your table. Use terms “pathogen”, “common flora”, “accidental finding”, “colonization” and “contamination”

Finding	Interpretation

b) Indirect diagnostic interpretation

Interpret several clinical situations with data given on the card. Do not forget to make your interpretation on the base of both clinical findings and laboratory results (clinical findings)

Rewrite from the card (simplify the sentences)		Conclusion
Clinical situation	Serology examination r cultivation	Tissue for syphilis