

P11 Clinical microbiology II – examination in respiratory and GI infections

To study: Infections of various organs and organ systems (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

With the help of your teacher and the slideshow, describe the following picture. Use the knowledge from this picture in the Task 2 and Task 3.

disc containing _____

possible pathogen _____

possible pathogens: _____

disc containing _____ and _____

possible pathogen (tiny, colourless colonies, haemolysis) _____

possible pathogen (something larger, white colonies, haemolysis) _____

line of _____ because of _____

Culturable part of pharyngeal microbiom consists mostly of

a) _____ appearance: _____

b) _____ appearance: _____

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	příjmení dl A	IČP 7 2 1 2 3 4 5 6	Datum	Čís. dokladu	Poř. č.
		Odbornost 7 8 9 1 5 1 2 0 8		provedl dl B	
POUKAZ NA VYŠETŘENÍ / OŠETŘENÍ					
Pacient Linda Green		Accute bronchopneumonia, 38.5 °C, heavy diabetes			
Č. pojištění *1932		Kód náhrady			
Variabilní symbol					
Odeslán ad:					
Požadováno:					
sputum for bacteriological examination					
Poznámka:					
72 Dr. Michal Teplý 123 generální praktička 456 Kompostová 8, Brno					
VZP-06x1999		Dne: _____			
		razítko a podpis			

Name _____

DM Red box team _____

Date 25. 11. 2019

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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 in 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. Gradually, 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	accute tonsillitis, 38.8 °C			
Variabilní symbol					
Odeslán ad:					
	Kód náhrady				
Požadováno:	throat swab for bacteriological examination				
Poznámka:					
72 123 456	Dr. Microbe Terrible generální praktičtí lékař Kompostová 8, Brno				
	razítko a podpis lékaře				
VZP-06x/1999					
	Dne:				
	razítko a podpis				
		IČP			
		Odbornost			
		Var. symbol			
		Datum	Kód	Poč.	

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

Antibiotic susceptibility tests (bacterium C)

Penicillin (P)	R < 18 S ≥ 18		Chloramphenicol (C)	R < 19 S ≥ 19	
Erythromycin (E)	R < 18 S ≥ 21		Tetracyclin* (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 aspergillosis	

Examination in gastrointestinal system

Task 5: Examination in acute diarrhoea

In this case, stool has been 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.

Attention: On media like XLD, MAL, CIN or CCDA you identify the finding as “suspicious” only if it resembles the positive control (see the side table). Any other findings (something does grow, but “not like the control”) are considered negative!

The form contains the following information:

- Patient:** Cecilia Brown
- Diagnosis:** Acute diarrhoea
- Požadováno (Requested):** Stool for bacteriological examination
- Signature:** Dr. Michal Fejtl, general practitioner, 456 Chamuslově 8, Brno
- Date:** _____

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						
Serotypisation		Dental students do not 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>Clostridioides difficile</i> toxin	<i>Liquid stool in a container</i>