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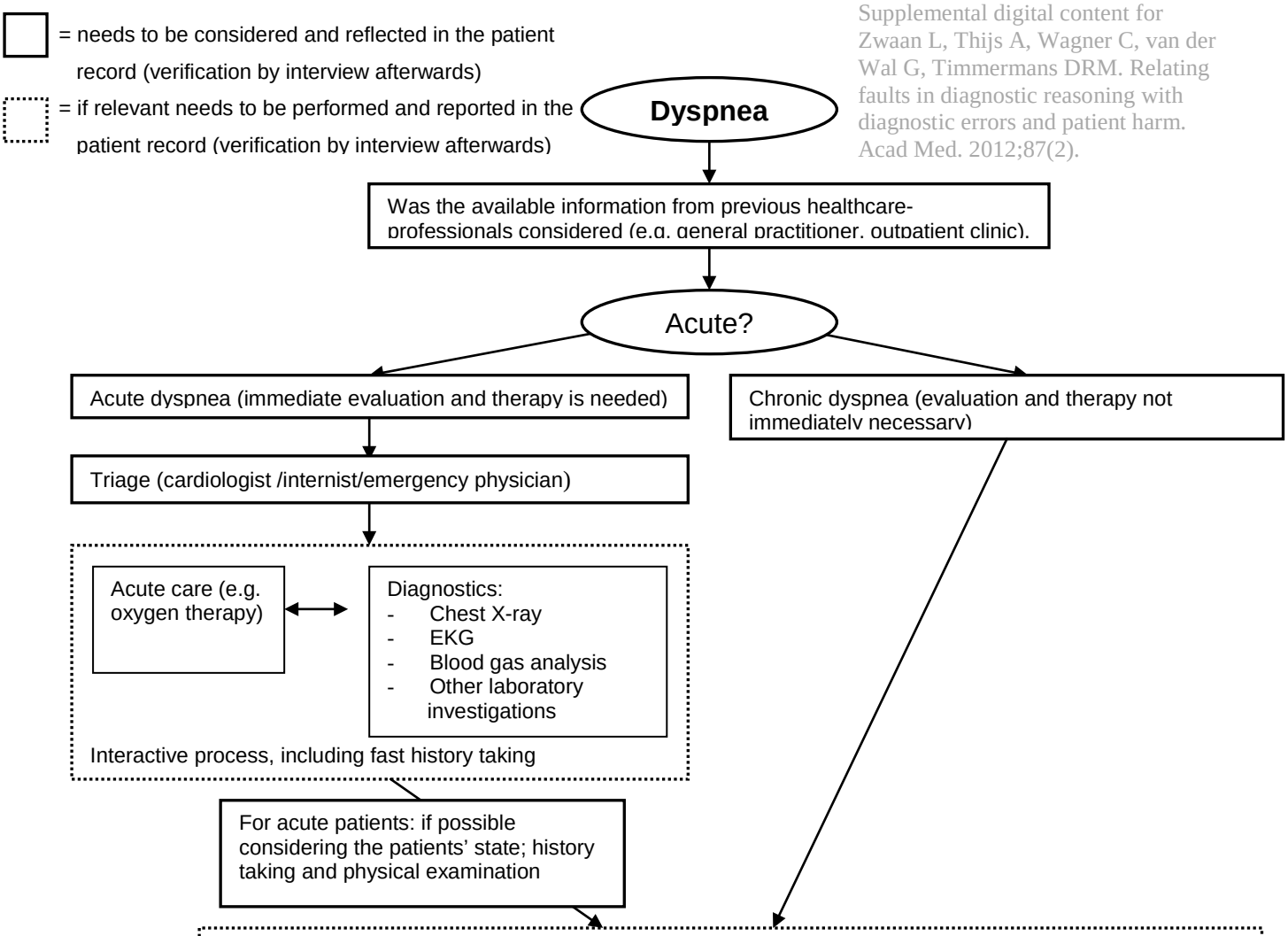
Supplemental Digital Appendix 1

Optimal Diagnostic Process for Dyspnea as Determined by Seven Expert Internists, 2008, The Netherlands



History taking:

1. Main complaints/symptoms:
- Chronology
  - When did the dyspnea start
  - How was the course over time
- Setting
  - Acute origination
  - Gradual origination
- What are the influencing factors
- What are the accompanying symptoms

2. Seriousness:
- Progressive or stable?
- In rest or during exertion?
- Classification of activities the patient is scarcely able to perform

3. Clues:
- Endurance
- Chest pain
- Heart fluttering
- History
  - History of heart and lung problems
  - Family history
- Smoking (pack years)
- Profession/ hobbies
- Visit to foreign country
- Varicose veins
- Edema
- Hypertension
- Cough and sputum production
- Hemoptysia
- Fever
- Pain while deep breathing
- Hoarseness
- Difficulty swallowing
- Hay fever
- Allergy
- Asthma/COPD
- Tuberculosis
- Drowsiness
- Fear
- Painful or swollen joints

Swollen legs, increase in weight
- Nycturia
- Polydipsia
- Medication
  - On physicians' prescription
  - Over the counter
  - Anti-conception
- Recent trauma, immobilization or one swollen leg
- Dizziness
- Paresthesia of fingers, toes or around the mouth

4. Review of systems

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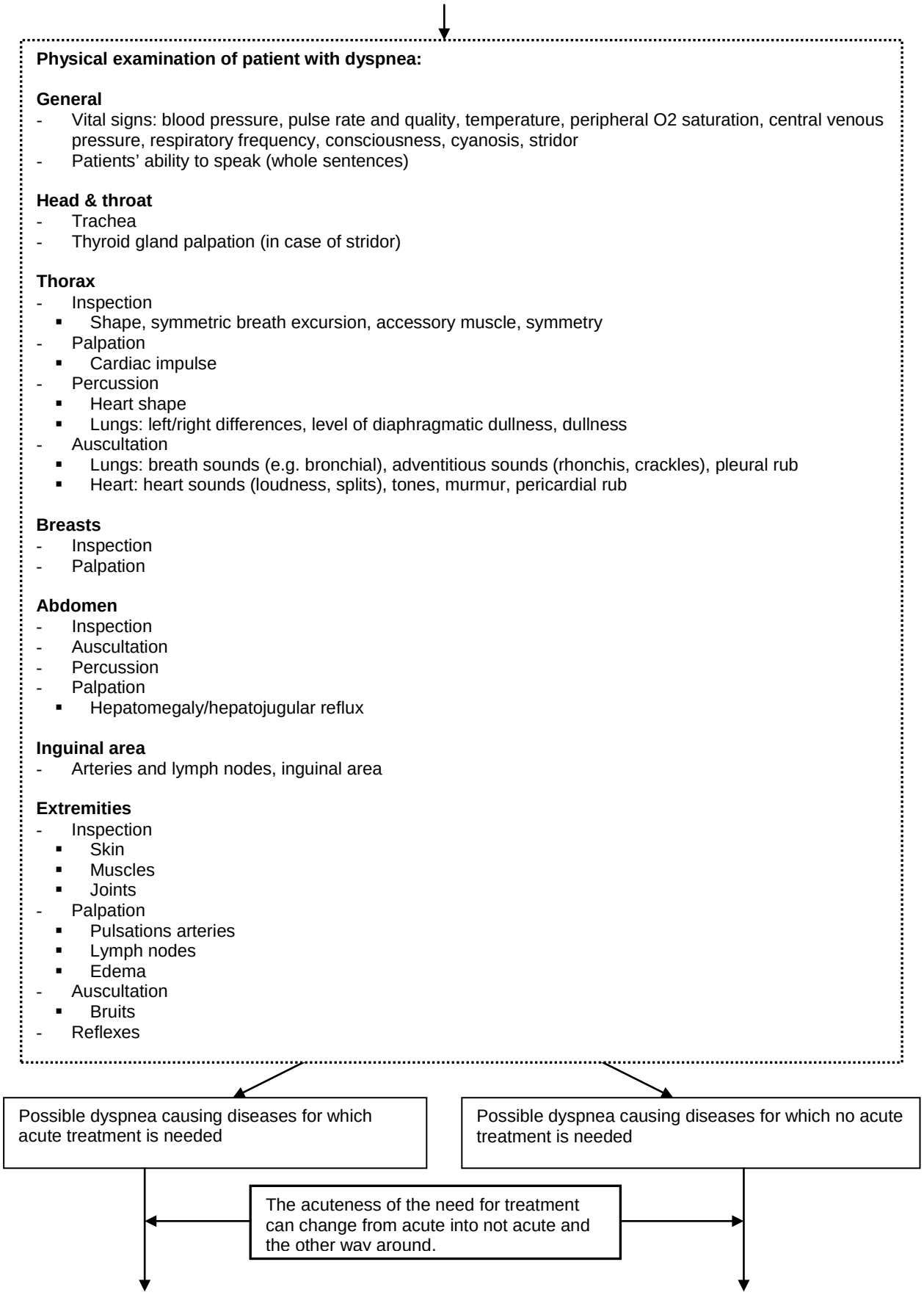

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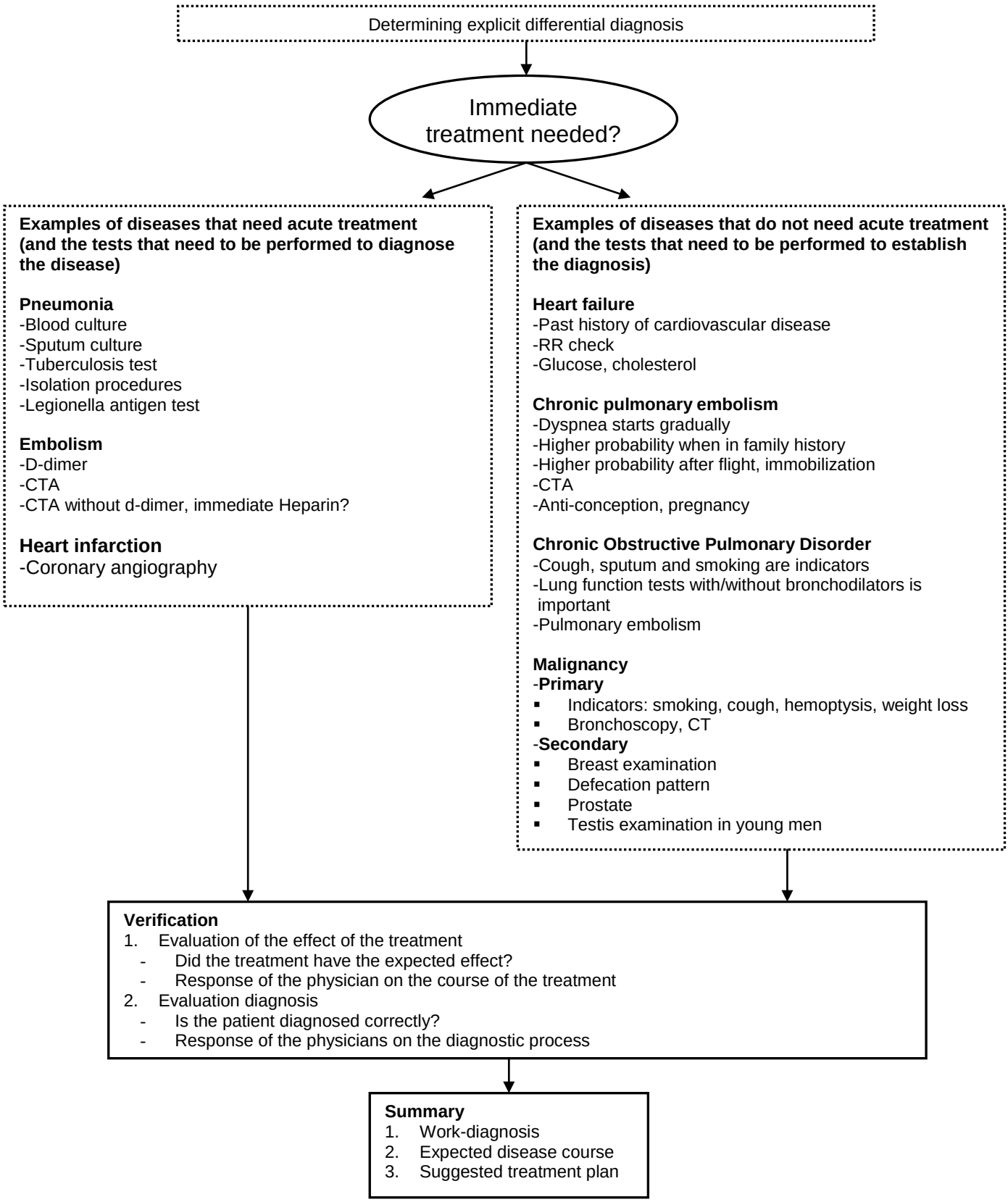

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Supplemental Digital Appendix 2

Record Review Questionnaire Used by Four Expert Internists to Review Records of 247 Dyspnea Patients to Identify Suboptimal Cognitive Acts, 2008, The Netherlands

A GENERAL INFORMATION

Hospital information

1. Indicate the hospital number: ☐☐☐☐☐☐
2. Indicate the research number: ☐☐☐☐☐☐

Reviewer information

3. Date of review: ☐☐-☐☐-☐☐☐☐
4. Identification number of reviewer: ☐☐☐☐

Patient information

6. Number patient record: ☐☐☐☐☐☐☐☐☐☐☐☐

7. Date of birth: ☐☐-☐☐-☐☐☐☐

8. Gender:
   - ❑ Male
   - ❑ Female

8. Date of hospital admission: ☐☐-☐☐-☐☐☐☐

9. Date of discharge from the hospital: ☐☐-☐☐-☐☐☐☐

10. What was the type of hospital admission?
    - ❑ Planned
    - ❑ Emergency
    - ❑ Re-admission
    - ❑ Transfer from……..
    - ❑ Other…….

11. What was the admission diagnosis of the patient?

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12. Did the patient have co-morbidity?
    - ❑ No
    - ❑ Yes, (please specify below)

B DIAGNOSTIC PROCESS

History taking

1. What risk factors can play a role?
   Select your answer from the following options in the table below:
   - ***1.*** Yes
   - ***2.*** Not noted in case file, but this question was probably asked
   - ***3.*** No, not inquired; or not noted in case file, but this question was probably **not** asked
   - ***4.*** Cannot be assessed

	Did treating physician ask about these risk factors? (indicate one of 4 options)	Is patient subject to these risk factors? (yes/no)	Would you have asked about these risk factors? (yes/no)
Smoking (pack years)			
Family history			
Profession			
Allergies			
Asthma			
Other			

2. How may development of shortness of breath in this patient be characterized?
   - ❑ Acute
   - ❑ Gradual
   - ❑ Physician did not inquire

3. Is shortness of breath in this patient progressive or stable?
   - ❑ Progressive
   - ❑ Stable
   - ❑ Physician did not inquire

4. How serious is shortness of breath in this patient?
   - ❑ Dyspnoea at rest
   - ❑ Dyspnoea during exertion
   - ❑ Physician did not inquire

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5. Which of the following issues were dealt with during the history taking?
   Select your answer from the following options in the table below:
   1. Yes
   2. Not noted in case file, but this question was probably asked
   3. No, not inquired; or not noted in case file, but this question was probably **not** asked
   4. Cannot be assessed

	Did physician discuss these issues with patient during history taking? (indicate one of 4 options)	Did history show that these factors were present or abnormal in the patient? (yes/no)	Would you have asked patient about these factors during history taking? (yes/no)
Increase in weight			
Chest pain			
Pain during breathing or deep inhalation			
Oedema (esp. in legs)			
Nycturia			
Hypertension			
Cough			
Sputum production			
Hemoptysis			
Fever			
Pain or swelling in joints			
Dizziness			
Palpitation			
Hoarseness			
Swallowing difficulties			
Tingling in fingers or toes, or around mouth			
Use of medication			
Other			

6. Were there complicating factors that made history taking difficult?
   - ❑ Yes
   - ❑ No
   - ❑ Cannot be assessed

If so, please specify.

7. Was the reason for referral taken sufficiently into account?
   - ❑ Yes

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- ❑ No
- ❑ Cannot be assessed

If not, please amplify and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

8. Was the patient's recent medical history taken sufficiently into account in the diagnostic process?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please amplify and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

9. Did the treating physician discover the disorders related to the underlying disease during the history taking?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which disorders were missed and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

10. Did the physician interpret the findings correctly?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which findings were incorrectly interpreted and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

Physical examination

11. Which of the following aspects were examined during the physical examination? Select your answer from the following options in the table below:
    - ***1.*** Yes
    - ***2.*** Not noted in case file, but this aspect was probably examined
    - ***3.*** No, not examined; or not noted in case file, but probably **not** examined
    - ***4.*** Cannot be assessed

	Did the treating physician include these aspects in the physical examination? (indicate one of 4 options)	Were the findings during the physical examination abnormal on these points? (yes/no)	Would you have examined these aspects during the physical examination? (yes/no)
Vital signs			

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General impression			
Blood pressure while standing			
Blood pressure while lying down			
Pulse rate while standing			
Pulse rate while lying down			
Temperature			
Peripheral O2 saturation/ Cyanosis			
Central venous pressure			
Respiratory rate			
Consciousness			
Pulsus paradoxus			
Inspiratory stridor			
Head & Neck			
Trachea			
Thyroid (in case of stridor)			
THORAX			
Form			
Symmetrical respiratory excursion			
Cardiac cycle			
Cardiac shadow			
Lungs: difference between left and right, boundaries of lungs, damping, respiratory sounds present, absent or enhanced, expiration normal or prolonged, further sounds such as rhonchi, crepitation or pleural rub			
Heart: loudness of heart sounds, degree of splitting tones, murmur, pericardial rub			
BREASTS			
Inspection			
Palpation			
ABDOMEN			
Inspection			
Percussion			
Palpation			
Hepatomegaly and hepatojugular reflux			

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GROIN			
Femoral artery and lymph nodes, inguinal canal			
EXTREMITIES			
Oedema			
Colour			
Symmetrical circumference of calves			
Other			

12. Were there complicating factors (such as the patient's condition) that made the physical examination difficult or impossible to perform?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If so, please specify.

13. Did the treating physician discover the disorders related to the underlying disease during the physical examination? (For example, did he hear the pleural rub associated with pulmonary embolism?)
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which disorders were missed and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

14. Did the physician interpret the findings correctly?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which findings were incorrectly interpreted and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

15. Were the correct conclusions drawn on the basis of the medical history and the physical examination?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which incorrect conclusions were drawn and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

Requesting laboratory tests

16. Which of the following laboratory tests were requested (up to the making of the probable diagnosis)?
    Select your answer from the following options in the table below:

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1. Yes
2. No

		Were these lab tests requested by the treating physician?	Was the result of these lab tests abnormal?	Would you have requested these lab tests?
Tests on blood samples				
Full blood gas analysis ❑ Yes ❑ No				
	pH			
	pCO_2			
	pO_2			
	Base excess			
	Bicarbonate			
	Oxygen saturation			
CO-Hb				
Met-Hb				
ESR/CRP				
CRP				
Erythrocyte Sedimentation rate (ESR)				
Haematology				
Haemoglobin				
Haematocrit				
Erythrocytes				
Leukocytes				
Differentiation: ❑ Yes ❑ No				
	White blood cell differentiation			
	Eosinophils			
	Neutrophils %			
Chemistry				
Electrolytes: ❑ Yes ❑ No	Sodium			
	Potassium			
	Chloride			
	Calcium			
	Magnesium			
	Phosphate			
Creatinine				
Albumin (chem)				
Glucose (plasma)				
Osmolality				
Bilirubin				

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Lactate				
Urine analysis ❑ Yes ❑ No	Sediment			
	Protein			
	Ketones			
Liver enzymes/ transaminases: ❑ Yes ❑ No	AF			
	Gamma-GT			
	AST			
	ALT			
	LD			
Cardiac/muscle enzymes: ❑ Yes ❑ No	CK			
	MB			
	Troponin			
Misc. Chemistry				
Ammonium				
ACE				
Pancreas: ❑ Yes ❑ No	Lipase			
	Amylase			
D-dimer				
Culture and serology				
Microbiology/serology: ❑ Yes ❑ No	Basic blood culture			
	Basic sputum culture			
	Mycobacteria (incl. TB)			
	Pneumocystis jirovecii			
	Mycoplasma pneumoniae			
	Chlamydia pneumoniae			
	Legionella antigen test			
Other tests such as: Plasma protein, lipids, iron status (Fe, TIBC or transferrin saturation, ferritin), HbA1c, vitamins (B1, B12, folic acid), ANF, ANCA				

17. Were there complicating factors that made it difficult to perform or request the lab tests?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If so, please specify

18. Did the physician request the lab tests needed to diagnose the patient's condition?
    - ❑ Yes
    - ❑ No

a. Did the physician request too many lab tests?

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- ❑ No
- ❑ Yes

If so, please indicate which lab tests were not needed, and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

b. Did the physician request too few lab tests?
   - ❑ No
   - ❑ Yes

If so, please indicate which additional lab tests should have been requested and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

19. Did the treating physician notice the abnormal results of the lab tests performed?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which pathological results were missed and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

20. Did the treating physician interpret the results of the lab tests correctly?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which results were incorrectly interpreted and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

21. Which of the following scans or tests were requested or should have been requested?
    Select your answers from the following options in the table below:
    - ***1.*** Yes
    - ***2.*** No

	Did the treating physician request these additional tests?	Did these additional tests reveal any disorders?	Would you have requested these additional tests?
Chest X ray			
CT (HR) thorax			
CT (conventional) thorax			
CT (angiography) thorax			
Bronchoscopy			
Biopsy			
Broncho alveolar lavage			
EKG			
Spinometry			
Other			

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22. Were there complicating factors (such as the patient's condition) that made it difficult or impossible to perform the additional lab tests or scans?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If so, please specify.

23. Did the physician request the right additional tests?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

a. Did the physician request too many additional lab tests?
    - ❑ No
    - ❑ Yes

If so, please indicate which additional lab tests were not needed and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

b. Did the physician request too few additional lab tests?
    - ❑ No
    - ❑ Yes

If so, please indicate which additional lab tests should have been requested and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

24. Could the results of the additional tests be clearly interpreted?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, why not?

25. Did the physician interpret the results of the additional tests correctly?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please describe which results were incorrectly interpreted and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

26. Did the physician notice the abnormal results of the additional lab tests performed?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, please indicate which abnormal results were missed and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

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27. Did the additional tests requested have any adverse effects on the patient? (e.g. nephropathy caused by CT contrast medium, bleeding after a perforation biopsy)
    - ❑ No
    - ❑ Yes
    - ❑ Cannot be assessed

If so, please specify and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

Diagnosis

28. What differential diagnosis was made?

29. Was the differential diagnosis made correct?
    - ❑ Yes, *go to question 31*
    - ❑ No
    - ❑ Cannot be assessed, but probably not

If not, please specify and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

30. Was the physician in a position to arrive at the correct diagnosis on the basis of the available data?
    - ❑ Yes
    - ❑ No

If not, why not?

31. Did the physician overlook any important information when making the diagnosis?
    - ❑ No
    - ❑ Yes

If so, describe what important information was overlooked and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

32. Do you think that the diagnostic procedure was correct?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, describe what procedure should have been followed and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

Treatment

33. Did the physician initiate the right treatment on the basis of the diagnosis made?
    - ❑ Yes
    - ❑ No

If not, describe what initial treatment should have been initiated and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

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Verification

34. Has the treatment had the desired effect?
    - ❑ Yes
    - ❑ No

If not, what effect should have been produced?

35. Did the physician check timely whether the initial treatment was successful?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, describe how and when should the treatment results have been checked and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

36. Did the treating physician respond timely after the check on effectiveness?
    - ❑ Yes
    - ❑ No
    - ❑ Cannot be assessed

If not, describe what should have been done, and when, and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

37. Did the involvement of more than one physician have adverse effects? (e.g. duplication of certain actions, or omission of necessary actions)
    - ❑ No, *go to question 39*
    - ❑ Yes
    - ❑ Cannot be assessed

38. What were the adverse effects of the involvement of more than one physician?
    - ❑ Tests or scans duplicated
    - ❑ Tests or scans not performed at all
    - ❑ Careless history taking and/or diagnosis
    - ❑ Other

Go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

39. Were the transfers from one health professional to another performed properly?
    - ❑ Yes
    - ❑ No

If not, describe what went wrong or what could have been done better and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

40. Does the case file provide evidence of adequate supervision by the main specialist?
    - ❑ Yes
    - ❑ No

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If not, describe what evidence is there of the lack of proper supervision and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

41. Did you notice any suboptimal events in the diagnostic process of the patient not noted above?
    - ❑ Yes
    - ❑ No

If yes, please specify and go to part C of this questionnaire, *Determining nature of suboptimal diagnostic events*

C DETERMINING NATURE OF SUBOPTIMAL DIAGNOSTIC EVENTS

HARM TO PATIENT

1. Did patient suffer unintentional harm?
    - ❑ Yes
    - ❑ No →*go to question 4 below*

If so, describe the harm suffered and the clinical context.

2. Classify the harm to the patient *(Tick all relevant answers.)*
    - ❑ Additional intervention or treatment
    - ❑ Health impairment at time of discharge
    - ❑ Re-admission to hospital
    - ❑ Death
    - ❑ Extra visit to outpatient clinic
    - ❑ Extra visit to emergency room
    - ❑ Other
    - ❑ None of the above

3. Could the consequences have been avoided?
    - ❑ Yes
    - ❑ No

If so, how?

Near Miss

4. Why was the patient in fact not harmed by the suboptimal event?

5. In what way could the patient have been harmed?