

## Supplemental Online Content

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**eAppendix.** ICD Codes Defining Sepsis, Infection, and Organ Dysfunction

**eTable 1.** SOFA Score Adapted for Use Outside of Intensive Care

**eTable 2.** The Linder-Mellhammar Criteria of Infection

This supplemental material has been provided by the authors to give readers additional information about their work.

## eAppendix. ICD Codes Defining Sepsis, Infection, and Organ Dysfunction

		ICD-10
Sepsis	Explicit sepsis codes	A02.1
		A20.0
		A20.7
		A21.7
		A22.7
		A24.1
		A26.7
		A28.2
		A32.7
		A39.1
		A39.2
		A39.3
		A39.4
		A40.
		A41.
		A42.7
		A48.3
		A49.9
		A54.8
		B00.7
		B37.6
		B37.7
		B49
		O75.3
		O85
		R65.0
		R65.1
R57.2		
	Severe sepsis	R65.1
	Septic shock	R57.2
Infections		J01
		J02
		J03
		J04
		J06
		J05
		J09
		J10
		J11
		J12
		J13
	J14	

J15  
J16  
J17  
J18  
J20  
J21  
J22  
J44.0  
J44.1  
J86  
J85  
A15  
A16  
U69.00  
A36  
A37  
B38  
B39  
P23  
P24.0  
P24.8  
P24.9  
A00  
A01  
A02  
A03  
A04  
A05  
A06  
A07  
A08  
A09  
K35  
K37  
K36  
K5702  
K5703  
K5712  
K57.13  
K57.22  
K57.23  
K57.32  
K5733  
K5742  
K5743  
K5752  
K5753  
K5782  
K5783

K5792  
K5793  
K61  
K65  
K67  
K63.0  
K63.1  
K75.0  
K75.1  
K81.0  
K77.0  
U69.40!  
P38  
P77  
P78.1  
A46  
B47  
L03  
L04  
L08  
L05  
B00  
B07  
B08  
B09  
H05.0  
H60.2  
H70.0  
J36  
J39.0  
J39.1  
L02  
N10  
N15.1  
N15.9  
N34  
N30  
N39.0  
N41  
N45  
N48.2  
N49  
N70  
N71  
N72  
N73  
N74\*  
N75  
N76

N77  
N61  
N98.0  
A59  
A55  
A56  
A39  
G00  
G01  
G02  
G03  
G04  
G05  
G06  
G07  
G08  
A17  
A81  
A83  
A84  
A85  
A86  
A87  
A88  
A89  
I32  
I33  
I39  
I40  
I41  
I80  
I38  
I98.1  
T82.6  
T82.7  
T83.5  
T83.6  
T84.5  
T84.6  
T84.7  
T85.7  
A18  
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A49  
A54  
A69.0  
A69.1  
A69.2  
A69.8  
A69.9  
A90  
A91  
A97  
B37  
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B42  
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B46  
B48  
B49  
B50  
B51  
B52  
B53  
B54  
M00  
M01  
M86  
T80.2  
T81.4  
T88.0  
A50  
A65  
A74  
A75  
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A80  
A92

A93  
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B64  
B67  
B95  
B96  
B97  
B98  
B99  
P35  
P37  
P39  
O75.3  
O85  
O030  
O035  
O040  
O045  
O050  
O055  
O060  
O065  
O070  
O075  
O08.0  
O86  
O23  
O41.1  
O88.3  
O98  
O91

Organ  
dysfunction

I95.9  
R57.8  
R57.9  
R57.2  
J96.  
J80  
J98.4  
R06.0  
R06.8  
F05  
G93.1  
G93.4  
R40  
N17.  
N19  
E87.2  
D65  
D68.8  
D68.9  
D69.5  
D69.6  
K72.0  
K72.7  
K72.9  
K76.2  
K76.3



eTable 1. SOFA Score Adapted for Use Outside of Intensive Care

Organ system	SOFA score			
	1	2	3	4
<b>Respiration</b> PaO <sub>2</sub> /FIO <sub>2</sub> mmHg corresponding SpO <sub>2</sub> without O <sub>2</sub> support	< 400 <95%	< 300 <91%	<200 with respiratory support	<100
<b>Coagulation</b> Platelets x 10 <sup>9</sup> /L	< 150	< 100	< 50	< 20
<b>Liver</b> Bilirubin μmol/L	>19	>32	>101	>204
<b>Cardiovascular</b> Hypotension	MAP < 70mmHg	Dopamine ≤ 5 μg/kg/min or dobutamine	Dopamine > 5 or epinephrine or norepinephrine ≤ 0,1 μg/kg/min	Dopamine > 15 or epinephrine or norepinephrine >0.1 μg/kg/min
<b>Central Nervous System</b>				
Glasgow Coma Scale	13-14	10-12	6-9	3-5
<b>Renal</b> Creatinine μmol/L	>110	>170	>300	>440
or urine output mL/day			< 500	< 200

eTable 2. The Linder-Mellhammar Criteria of Infection

For each focus, 1-4 points are given for the following entities: symptoms and signs, radiological findings, laboratory findings, and microbiologic findings in relation to the suspected infection. These entities are grouped together as rows in a table for each infection focus. The highest scores from all rows are added together to give a total score for each focus. The level of evidence of infection is graded according to the scores:

0-1 points, no infection

2 points, possible infection

3 points, probable infection,

4 or more points, proven infection

Table 1. LOWER RESPIRATORY TRACT INFECTION

Clinical entity	1	2	3	4
<b>Symptoms</b>	<p><u>Localized symptoms</u></p> <ul style="list-style-type: none"> <li>• Purulent sputum or change in character of sputum</li> <li>• New onset of cough or worsening of cough</li> <li>• Pleural pain</li> </ul> <p><u>Generalized symptoms</u></p> <ul style="list-style-type: none"> <li>• Fever &gt;38°C or history of fever</li> <li>• Rigors</li> <li>• Leukocytosis or leukopenia</li> </ul>			
<b>Signs</b>	Possible fine crackles without other likely cause	Distinct crackles or bronchial breath sounds		
<b>Radiological findings</b>	Possible pneumonic infiltrate		Probable pneumonic infiltrate	Cavitation Abscess Empyema
<b>Microbiological findings</b>	<ul style="list-style-type: none"> <li>• Detection of viral pathogens in respiratory tract</li> <li>• Detection of pneumococci-antigen in urine</li> </ul>	<ul style="list-style-type: none"> <li>• Growth of likely pathogen from respiratory secretions</li> <li>• Pneumocystis detected in immunocompromised patient</li> <li>• Detection of legionella-antigen in urine</li> </ul>	<ul style="list-style-type: none"> <li>• Detection of Chlamydia, Mycoplasma, Chlamydia, Legionella antigen, DNA or RNA in respiratory tract</li> <li>• Growth of pathogens in specimen from bronchoscopy</li> <li>• Growth in blood culture of pneumonia-pathogens without any other source in association with focal symptoms or signs</li> </ul>	Detection of pathogens in pleural fluid culture, not from already present drain

Table 2. URINARY TRACT INFECTION

Clinical entity	1	2	3	4
<b>Symptoms</b>	<p><u>Localized symptoms</u></p> <ul style="list-style-type: none"> <li>Mild urinary tract symptoms<sup>1</sup></li> </ul> <p><u>Generalized symptoms</u></p> <ul style="list-style-type: none"> <li>Fever &gt;38°C or history of fever</li> <li>Rigors</li> <li>Leukocytosis or leukopenia</li> </ul>	Distinct urinary tract symptoms <sup>1</sup>		
<b>Signs</b>	Localized tenderness (suprapubic or surrounding kidney)			
<b>Radiologic findings</b>				Abscess or inflammation
<b>Laboratory findings</b>	<ul style="list-style-type: none"> <li>Positive dipstick for leukocyte esterase or nitrate</li> <li>or pyuria in microscopic exam not from existing catheter</li> </ul>			
<b>Microbiological findings</b>	>10 <sup>5</sup> CFU/mL of a single primary urinary pathogen from existing catheter (>7 days)	>10 <sup>5</sup> CFU/mL of a single pathogen not from existing catheter	Growth in blood culture of uropathogen without any other source	<ul style="list-style-type: none"> <li>Growth in other specimen than urine from the bladder or upper urinary tract</li> <li>Growth of same pathogen in blood culture and urine</li> </ul>

1. Symptoms relevance graded by clinician, can include urgency, frequency, dysuria

Table 3. ABDOMINAL INFECTION

Clinical entity	1	2	3	4
<b>Symptoms and signs</b>	<u>Localized symptoms and signs</u> <ul style="list-style-type: none"> <li>abdominal pain</li> <li>tenderness</li> <li>jaundice</li> </ul> <u>Generalized symptoms and signs</u> <ul style="list-style-type: none"> <li>Fever &gt;38°C or history of fever</li> <li>Rigors</li> <li>Leukocytosis or leucopenia</li> </ul>	Peritonitis		Surgical confirmation
<b>Radiological findings</b>		Inflammatory findings		Abscess Perforation
<b>Laboratory findings</b>		Inflammatory peritoneal fluid		
<b>Microbiological findings</b>			Growth in blood culture with pathogens compatible of abdominal infection in association with focal symptoms or signs	Detection in specimen from the affected site, not from remaining drain

Table 4. GASTROINTESTINAL INFECTION

Clinical entity	1	2	3	4
<b>Symptoms and signs</b>		Indistinct symptoms and signs <sup>1</sup> <u>Generalized symptoms and signs</u> <ul style="list-style-type: none"> <li>Fever &gt;38°C or history of fever</li> <li>Rigors</li> <li>Leukocytosis or leukopenia</li> </ul> <u>Localized symptoms</u>	Distinct symptoms and signs <sup>1</sup> <u>Generalized symptoms and signs</u> <ul style="list-style-type: none"> <li>Fever &gt;38°C or history of fever</li> <li>Rigors</li> <li>Leukocytosis or leukopenia</li> </ul> <u>Localized symptoms</u>	

		<ul style="list-style-type: none"> <li>• Diarrhea</li> <li>• Abdominal pain</li> <li>• Tenderness</li> <li>• Nausea</li> <li>• Vomiting</li> </ul>	<ul style="list-style-type: none"> <li>• Diarrhea</li> <li>• Abdominal pain</li> <li>• Tenderness</li> <li>• Nausea</li> <li>• Vomiting</li> </ul>	
<b>Microbiological findings</b>		Enteric pathogen or clostridial toxin detected from stool or rectal swab		Growth in blood culture without any other source with pathogens compatible of gastrointestinal infection <sup>2</sup>

1. Symptoms and signs relevance graded by clinician

Table 5. SKIN & SOFT-TISSUE INFECTION

Clinical entity	1	2	3	4
<b>Symptoms</b>	<u>Localized symptoms</u> <ul style="list-style-type: none"> <li>• Pain</li> <li>• Tenderness</li> <li>• Swelling</li> <li>• Heat</li> </ul> <u>Generalized symptoms</u> <ul style="list-style-type: none"> <li>• Fever &gt;38°C or history of fever</li> <li>• Rigors</li> <li>• Leukocytosis or leukopenia</li> </ul>		Toxic shock (shock, generalized erythema w/wo vomiting) in association with focal symptoms or signs	
<b>Signs</b>			<ul style="list-style-type: none"> <li>• Erythema (new localized)</li> <li>• drainage of pus</li> <li>• lymphangitis</li> <li>• crepitations</li> </ul>	Surgical confirmation
<b>Radiological findings</b>			Presence of inflammation or abscess	
<b>Laboratory findings</b>		Positive antigen test for group A streptococci from suspected site of infection		
<b>Microbiological findings</b>		Detection in superficial specimen from suspected focus of infection of relevant pathogens	Growth in blood culture without any other source with pathogens compatible of SSTI in association with focal symptoms or signs	Detection in specimen from the affected site, not from remaining drain or superficial specimen

Table 6. BONE AND JOINT INFECTION

Clinical entity	1	2	3	4
<b>Symptoms and signs</b>	<u>Localized symptoms and signs</u> <ul style="list-style-type: none"> <li>• Swelling</li> <li>• Tenderness</li> <li>• Limitation of motion</li> <li>• Heat</li> </ul> <u>Generalized symptoms</u> <ul style="list-style-type: none"> <li>• Fever &gt;38°C or history of fever</li> <li>• Rigors</li> <li>• Leukocytosis or leukopenia</li> </ul>			Surgical confirmation
<b>Radiological findings</b>		Radiological evidence		
<b>Laboratory findings</b>		Joint fluid analysis compatible of infection, without other explanation		
<b>Microbiological findings</b>			Growth in blood culture without any other source with pathogens compatible of bone and joint infection in association with focal symptoms or signs	Detection in specimen from the affected site



Table 7. CENTRAL NERVOUS SYSTEM INFECTION

Clinical entity	1	2	3	4
<b>Symptoms and signs</b>	Localized symptoms and signs <ul style="list-style-type: none"> <li>• headache</li> <li>• irritability</li> <li>• mild neck stiffness</li> </ul> Generalized symptoms <ul style="list-style-type: none"> <li>• Fever &gt;38°C or history of fever</li> <li>• Rigors</li> <li>• Leukocytosis or leukopenia</li> </ul>	Distinct nuchal rigidity		Surgical confirmation
<b>Radiological findings</b>			Radiological evidence	Abscess
<b>Laboratory findings</b>			Increased white blood cells, protein and/or decreased glucose in CSF	
<b>Microbiological findings</b>			Growth in blood culture without any other source with pathogens compatible of CNS infection in association with focal symptoms or signs	Detection of pathogens in CSF Growth in specimen from the affected site

Table 8. PRIMARY BLOODSTREAM INFECTIONS

Clinical entity	1	2	3	4
Microbiological findings				Growth in blood culture of pathogens without any other source of infection. Growth in blood culture with possible skin contaminants <sup>1</sup> the same in two or more cultures drawn from separate venous punctures

1. For example Coagulase-negative staphylococci, Propionibacterium cuti, Bacillus species, diphtheroids or micrococci  
Primary bloodstream infection is only considered when score is higher than in any other infection focus.

Table 9. CATHETER-RELATED INFECTION

Clinical entity	1	2	3	4
Microbiological findings		Growth in blood culture from catheter exit site		
Microbiological findings		Growth in culture of tip		
Microbiological findings		Growth in blood culture		

For a proven infection, the same microorganism needs to be found in different specimen  
For a proven infection based on blood culture and blood culture from catheter, growth has to be recorded >120 minutes earlier from catheter

Table 10. EAR NOSE THROAT INFECTION

Clinical entity	1	2	3	4
<b>Symptoms</b>	Localized symptoms <ul style="list-style-type: none"> <li>• Pain</li> </ul> Generalized symptoms <ul style="list-style-type: none"> <li>• Fever &gt;38°C or history of fever</li> <li>• Rigors</li> <li>• Leukocytosis or leukopenia</li> </ul>			Surgical confirmation
<b>Signs</b>	Erythema of pharynx	<ul style="list-style-type: none"> <li>• Purulent drainage</li> <li>• Inflammation in the ear canal</li> <li>• Retraction or decreased mobility of eardrum</li> <li>• Visible abscess or swollen soft palate</li> </ul>		
<b>Radiological findings</b>			Radiological evidence	
<b>Microbiological findings</b>	Positive antigen test for group A streptococci		<ul style="list-style-type: none"> <li>• Detection in specimen from the affected site</li> <li>• Growth in blood culture without any other source with pathogens compatible of ENT infection in association with focal symptoms or signs</li> </ul>	

Table 11. UPPER RESPIRATORY TRACT INFECTION

Clinical entity	1	2	3	4
<b>Symptoms</b>	Localized symptoms <ul style="list-style-type: none"> <li>• Hoarseness</li> <li>• New onset of cough or worsening of cough</li> <li>• Purulent sputum</li> <li>• Dyspnea</li> </ul> Generalized symptoms <ul style="list-style-type: none"> <li>• Fever &gt;38°C or history of fever</li> <li>• Rigors</li> <li>• Leukocytosis or leukopenia</li> </ul>			
<b>Signs</b>	Wheezing			
<b>Radiological findings</b>				
<b>Microbiological findings</b>		Detection of viral pathogens in respiratory tract		

Table 12. NEUTROPENIC FEVER

Clinical entity	1	2	3	4
<b>Symptoms, signs and findings</b>	Fever >38°C sustained for 1 h or repeatedly or >38.3			
<b>Laboratory findings</b>	Neutrophil count <0.5 x 10 <sup>9</sup> /L			

Table 13. REPRODUCTIVE TRACT INFECTION

Clinical entity	1	2	3	4
<b>Symptoms and signs</b>	<u>Localized symptoms</u> <ul style="list-style-type: none"> <li>• Tenderness</li> <li>• Dysuria</li> <li>• Purulent discharge</li> </ul> <u>Generalized symptoms</u> <ul style="list-style-type: none"> <li>• Fever &gt;38°C or history of fever</li> <li>• Rigors</li> <li>• Leukocytosis or leukopenia</li> </ul>			Surgical confirmation
<b>Radiological findings</b>			Radiological evidence	Abscess
<b>Laboratory findings</b>		Positive antigen test for group A streptococci		
<b>Microbiological findings</b>			<ul style="list-style-type: none"> <li>• Detection in specimen from the focus of infection</li> <li>• Growth in blood culture without any other source with pathogens compatible of RTI infection, in association postpartum or with focal symptoms or signs</li> </ul>	