# Oxford Academic Health Science Network
## PATIENT SAFETY

## A GUIDE FOR IDENTIFYING SUSPICION OF SEPSIS USING HOSPITAL EPISODE STATISTICS

The lack of suitable outcome measures for sepsis have hampered evaluation of local and national campaigns and improvement programs (Rhee et al., 2014). In a recent paper we developed a methodology for identifying patients with 'suspicion of sepsis' who are the critical target group both for clinical intervention and for sepsis detection and improvement programmes. The accompanying paper in BMJ Open (Inada Kim et al., 2017) describes our approach and findings but contains only a limited account of the coding and analysis. This brief guide complements the paper and provides a full description of our coding strategy to allow others to identify suspicion of sepsis patients in their own organisation or region.

**The problem with simply using sepsis codes**

Sepsis is coded in Hospital Episode Statistics (HES) data with codes starting with A40/41. While this is important information we need to adopt a broader perspective to fully explore the impact of sepsis improvement programmes. The main reasons for this are:

1.      Most sepsis campaigns and improvement programs do not target the treatment of fully developed sepsis but instead are aimed at the rapid detection and treatment of patients with suspicion of sepsis. Clinicians do not treat sepsis per se, they treat proactively for sepsis when there are signs of infection. The concept of assessing and treating patients with suspected sepsis is central to the 2016 NICE guidelines. The target population is therefore suspicion of sepsis, not sepsis.

2.      Specific sepsis codes (A40/A41) currently severely underestimate the true incidence of sepsis (NCEPOD, 2015). Clinicians and coders in the UK typically document the source of infections (e.g. pneumonia, urinary tract infection) rather than documenting sepsis (NCEPOD, 2015). New UK guidelines for the coding of sepsis were introduced in April 2017 requiring both sepsis and its source to be coded; as a result, rapid increases in A40/A41 are expected to occur nationally. Caution is needed in interpreting trends in mortality for specific sepsis codes: it may be unclear to what extent falls in mortality for specific sepsis codes are due to actual improvements in care or a diluting effect of increased coding of patients who are less sick than those who would previously have been included.

**Defining and identifying patients with 'suspicion of sepsis'**

The group, "suspicion of sepsis", consists of patients who have a bacterial infection serious enough to require hospital admission. A list of 200 clinically validated ICD- 10 codes that relate to bacterial infection have been developed to allow the identification of patients with suspicion of sepsis from local administrative data (Hospital Episode Statistics or Local Hospital Operational Data). The outcomes of these patients (e.g. mortality, length of stay, readmission rate, intensive care admissions) can be tracked over time to assess the impact of treatments and improvement programmes.

**How to extract suspicion of sepsis data**

The following fields are required from Hospital Episode Statistics data (or hospital operational data available from local hospital informatics teams):

| Field Name |
| --- |
| Admission Month |
| Admission Year |
| Discharge Method |
| IPAdmissionMethodValue |
| ProviderCode |
| CCG Code of Responsibility |
| Primary Diagnosis |
| Age on Admission |
| Gender |
| Length of Stay (Spell Duration) |
| Discharge Destination |
| Death Month |
| Death Year |
| Did they Attend Critical Care? |

The query must be filtered using the following WHERE clauses:

- Only Finished Consultant Episodes to be included
- We will be interested in looking at the admission episode only so Episode Order = 1. All fields can be taken from episode 1, except the following which must be based on the final episode of the spell:

| Length of Stay (Spell Duration) |
| --- |
| Discharge Destination |
| Death Month |
| Death Year |

**"Suspicion of sepsis" coding set: ICD-10 bacterial infection codes**

Filter the primary diagnosis of the first episode by the following by 4 digit ICD-10 codes given below.

**I. Certain Infectious and parasitic diseases**

1. A01 Typhoid and paratyphoid fevers (incl. A01.0, A01.1, A01.2, A01.3, A01.4)
2. A02 Other salmonella infections (incl. A02.0, A02.1, A02.2, A02.8, A02.9)
3. A03 Shigellosis (incl. A03.0, A03.1, A03.2, A03.3, A03.8, A03.9)
4. A04 Other bacterial intestinal infections (incl. A04.0, A04.1, A04.2, A04.3, A04.4, A04.5, A04.6, A04.7, A04.8, A04.9)
5. A06 Amoebiasis (incl. A06.0, A06.1, A06.2, A06.3, A06.4, A06.5, A06.6, A06.7, A06.8, A06.9)
6. A15 Respiratory tuberculosis (incl. A15.0, A15.2, A15.3, A15.4, A15.5, A15.6, A15.7, A15.8, A15.9)
7. A16 Respiratory tuberculosis, not confirmed bacteriologically or histologically (incl. A16.0, A16.1, A16.2, A16.3, A16.4, A16.5, A16.7, A16.8, A16.9)
8. A17 Tuberculosis of nervous system (incl. A17.0, A17.1, A17.8, A17.9)
9. A18 Tuberculosis of other organs (incl. A18.0, A18.1, A18.2, A18.3, A18.4, A18.5, A18.6, A18.7, A18.8)
10. A19 Miliary tuberculosis (incl. A19.0, A19.1, A19.2, A19.8, A19.9)
11. A27 Leptospirosis (incl. A27.0, A27.8, A27.9)
12. A32 Listerosis (incl. A32.0, A32.1, A32.7, A32.8, A32.9)
13. A37 Whopping cough (all subcategories)
14. A38 Scarlet fever
15. A39 Meningococcal infection (incl. A39.0, A39.1, A39.2, A39.4, A39.5, A39.8, A39.9)
16. A40 Streptococcal sepsis (incl. A40.0, A40.1, A40.2, A40.3, A40.8, A40.9)
17. A41 Other Sepsis (incl. A41.0, A41.1, A41.2, A41.3, A41.4, A41.5, A41.8, A41.9)
18. A42 Actinomycosis (all subcategories)
19. A43 Nocardiosis (all subcategories)
20. A44 Bartenollosis (all subcategories)
21. A46 Erysipelas
22. A48 Other Bacterial diseases, not elsewhere classified (incl. A48.0, A48.1, A48.2, A48.3, A48.4, A48.8)
23. A49 Bacterial infection of unspecified site (incl. A49.0, A49.1, A49.2, A49.3, A49.8, A49.9)
24. A51 Early syphilis (all subcategories)
25. A54 Gonococcal infection (incl. A54.1, A54.2, A54.3, A54.4, A54.5, A54.6, A54.8, A54.9)
26. A55 Chlamydial lymhogranuloma (venereum)
27. A56 Other sexually transmitted chlamydial diseases (incl. A56.0, A56.1, A56.2, A56.3, A56.4, A56.8)

28. A68 Relapsing fevers (all subcategories)
29. A69.2 Lyme disease
30. A70 Chlamydia psittaci infection
31. A75 Typhus fever (all subcategories)
32. A77 Spotted fever (all subcategories)
33. A78 Q fever
34. A79 Other rickettsioses (all subcategories)
35. B59 Pneumocystosis

## VI. Diseases of the nervous system

36. G00 Bacterial meningitis, not elsewhere classified (incl. G00.0, G00.1, G00.2, G00.3, G00.8, G00.9)
37. G01 Meningitis in bacterial diseases classified elsewhere
38. G04.2 Bacterial meningoencephalitis and meningomyelitis, not elsewhere classified
39. G06 Intracranial and intraspinal abscess and granuloma (incl. G06.0, G06.1, G06.2)

## VIII. Diseases of the ear and mastoid process

40. H60 Otitis externa (incl. H60.0, H60.1, H60.2, H60.3)
41. H66 Suppurative and unspecified otitis media (incl. H66.0, H66.4, H66.9)
42. H67.0 Otitis media in bacterial diseases classified elsewhere
43. H68.0 Eustachian salpingitis
44. H70 Mastoiditis and related conditions (incl. H70.0, H70.9)
45. H73.0 Acute myringitis

## IX. Diseases of the circulatory system

46. I00 Rheumatic fever without mention of heart involvement
47. I01 Rheumatic fever with heart involvement (incl. I01.0, I01.1, I01.2, I01.8, I01.9)
48. I02 Rheumatic chorea (incl. I02.0, I02.9)
49. I33 Acute and subacute endocarditis (incl. I33.0, I33.9)
50. I38 Endocarditis, valve unspecified

## X. Diseases of the respiratory system

51. J01 Acute sinusitis (incl. J01.0, J01.1, J01.2, J01.3, J01.4, J01.8, J01.9)
52. J02 Acute pharyngitis (incl. J02.0,  J02.9)
53. J03 Acute tonsillitis (incl. J03.0, J03.9)
54. J05.1 Acute epiglottitis
55. J06.9 Acute upper respiratory infection, unspecified
56. J13 Pneumonia due to Streptococcus pneumoniae,

57. J14 Pneumonia due to Haemophilus influenza,
58. J15 Bacterial pneumonia, not elsewhere classified (J15.0, J15.1, J15.2, J15.3, J15.4, J15.5, J15.6, J15.7, J15.8, J15.9)
59. J16 Pneumonia due to other infectious organisms, not elsewhere classified (incl. J16.0, J16.8)]
60. J17.0 Pneumonia in bacterial diseases classified elsewhere (incl. J17.0, J17.8)
61. J18 Pneumonia, organism unspecified (including J18.0, J18.1, J18.2, J18.8 and J18.9)
62. J20 Acute bronchitis (incl. J20.0, J20.1, J20.2, J20.8, J20.9)
63. J22 Unspecified acute lower respiratory infection
64. J36 Peritonsillar abscess
65. J39 Other diseases of upper respiratory tract (incl. J39.0, J39.1)
66. J44.0 Chronic obstructive pulmonary disease with acute lower respiratory infection
67. J69 Pneumonitis due to solids and liquids (incl. J69.0, J69.8)
68. *J84.9 Interstitial pulmonary disease unspecified (interstitial pneumonia NOS)*
69. J85 Abscess of lung and mediastinum (incl. J85.1, J85.2, J85.3)
70. J86 Pyothorax (incl. J86.0, J86.9)
71. J95.0 Sepsis of tracheostomy stoma
72. J98.5 Diseases of mediastinum, not elsewhere classified- Mediastinitis

## XI. Diseases of the digestives system (dental disorders omitted)

73. K22.3 Perforation of oesophagus
74. K35 Acute appendicitis (incl. K35.2, K35.3, K35.8)
75. K37 Unspecified appendicitis
76. K57 Diverticular disease of intestine (incl. K57.0, K57.2, , K57.4, K57.8,)
77. K61 Abscess of anal and rectal regions (incl. K61.0, K61.1, K61.2, K61.3, 61.4)
78. K63.0 Abscess of intestine
79. K63.1 Perforation of intestine (nontraumatic)
80. K65.0 Acute peritonitis (incl. K65.0, K65.8, K65.9)
81. K67 Disorders of peritoneum in infectious diseases classified elsewhere (all subcategories)
82. K75.0 Abscess of liver
83. K80.0 Calculus of gallbladder with acute cholecystitis/cholangitis (incl.K80.0,  K80.1, K80.3, K80.4)
84. K81 Cholecystitis (incl. K81.0, K81.1, K81.8, K81.9)
85. K82.2 Perforation of gallbladder
86. K83.0 Cholangitis
87. K83.2 Perforation of bile duct

## XII. Diseases of skin and subcutaneous tissue

88. L00 Staphylococcal scalded skin syndrome

89. L01 Impetigo (L01.0, L01.1)
90. L02 Cutaneous abscess, furuncle and carbuncle (incl. L02.0, L02.1, L02.2, L02.3, L02.4, L02.8, L02.9)
91. L03 Cellulitis (including L03.0, L03.1, L03.2, L03.3, L03.8 and L03.9)
92. L05.0 Pilonidal cyst with abscess
93. L08 Other local infections of skin and subcutaneous tissue (incl. L08.0, L08.8, L08.9)
94. L30.3 Infective dermatitis
95. L53.3 Erythema marginatum
96. L98.0 Pyogenic granuloma

## XIII. Diseases of the musculoskeletal system and connective tissue

97. M00 Pyogenic arthritis (incl. M00.0, M00.1, M00.2, M00.8, M00.9)
98. M01 Direct infections of joint in infectious and parasitic diseases classified elsewhere (incl. M01.0, M01.1, M01.2, M01.3)
99. M46.2 Osteomyelitis of vertebra
100. M46.4 Discitis, unspecified
101. M65 Synovitis and tenosynovitis (incl. M65.0, M65.1)
102. M71.0 Abscess of bursa
103. M72.6 Necrotizing fasciitis
104. M86 Osteomyelitis

## XIV. Diseases of genitourinary system

105. N10 Acute tubulo-interstitial nephritis
106. N11 Chronic tubulo-interstitial nephritis (incl. N11.0, N11.1, N11.8, N11.9)
107. N12 Tubulo-intestitial nephritis, not specified as acute or chronic
108. N13.6 Pyonephrosis
109. N15.1 Renal and perinephric abscess
110. N15.9 Renal tubulo-interstitial disease, unspecified
111. N30 Cystitis, unspecified (including N30.0, N30.8, N30.9)
112. N34.0 Urethral abscess
113. N39.0 Urinary tract infection, site not specified
114. N41.0 Acute prostatitis
115. N43.1 Infected hydrocele
116. N45 Orchitis and epididymitis (incl. N45.0, N45.9)
117. N48.2 Other disorders of penis (incl. N48.1, N48.2)
118. N49.9 Inflammatory disorder of unspecified male genital organ
119. N61 Inflammatory disorders of breast

120. N70 Salpingitis and oophoritis (incl N70.0, N70.9)
121. N71 Inflammatory disease of uterus, except cervix (incl. N71.0, N71.9)
122. N73 Other female pelvic inflammatory diseases (incl. N73.0, N73.1, N73.2, N73.4, N73.9)
123. N75.1 Abscess of Bartholin gland
124. N76 Other inflammation of vagina and vulva (incl. N76.0, N76.1, N76.3, N76.4, N76.8)

## XV. Pregnancy, Childbirth and the puerperium

125. O08.0 Genital tract and pelvic infection following abortion and ectopic and molar pregnancy
126. O23 Infections of genitourinary tract in pregnancy (incl. O23.0, O23.1, O23.2, O23.3, O23.4, O23.5, O23.9)
127. O41.1 Infection of amniotic sac and membranes
128. O85 Puerperal sepsis
129. O86 Other puerperal infections (incl. O86.0, O86.1, O86.2, O86.3, O86.4, O86.8)
130. O88.3 Obstetric pyaemic and septic embolism
131. O91 Infections of breast associated with childbirth (incl. O91.0, O91.1)

## XVI. Certain conditions originating in the perinatal period

132. P36 Bacterial sepsis of newborn (incl. P36.0, P36.1, P36.2, P36.3, P36.4, P36.5, P36.8, P36.9)
133. P39 Other infections specific to the perinatal period (incl. P39.0, P39.2, P39.3, P39.4, P39.8, P39.9)
134. P78 Other perinatal digestives system disorders (P78.0, P78.1,)
135. T814 Infection following a procedure, not elsewhere classified
136. T845 Infection and inflammatory reaction due to internal joint prosthesis

## XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified

137. R57.2 Septic shock
138. R65 Systemic Inflammatory Response syndrome (incl. R65.0, R65.1, R65.9)

## REFERENCES

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