The Abdominal Sepsis Study: Epidemiology of Etiology and Outcome

An ESICM endorsed Trials Group Study

Study Protocol & Case Report Form
# Table of contents

1 Project title .................................................................................................................. 3
2 Organizational information .......................................................................................... 3
3 Background .................................................................................................................... 4
4 Objectives ..................................................................................................................... 5
5 Methods .......................................................................................................................... 6
   5.1 Study design ............................................................................................................. 6
   5.2 Ethics / IRB review .................................................................................................. 7
   5.3 ICU selection criteria ............................................................................................... 7
   5.4 Patient selection ...................................................................................................... 7
   5.5 Inclusion criteria ..................................................................................................... 7
   5.6 Start and duration of the study .............................................................................. 7
   5.7 Data collection ........................................................................................................ 8
   5.8 Data recorded .......................................................................................................... 8
   5.9 Study power ............................................................................................................ 8
   5.10 Practical aspects .................................................................................................... 9
   5.11 Publication plan .................................................................................................... 9
5 References ..................................................................................................................... 10

Appendix 1: Center Report Form .................................................................................... 11
Appendix 2: Case Report Form ....................................................................................... 12
Appendix 3 - Codes list admission diagnosis (2.5.) ....................................................... 32
1 Project title

Abdominal Sepsis ("AbSeS") study: Epidemiology of Etiology and Outcome

2 Organizational information

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Jordi RELLO, Barcelona (Spain)
Jean-Francois TIMSIT, Grenoble (France)

National representatives

The role of the national representatives (NC) can be summarized as follows:

1. Advertise the study in the individual countries and identify participating hospitals and local investigators in their country.
2. Apply for regulatory approval in a national level where applicable and ensure that ethical committee (EC) approvals or waivers for all the participating hospitals in the country are in place prior to the initiation of the study. The NC will receive
scanned copies of the EC approvals from all centers, will check them and report to
the Principal Investigator (PI). The checked by the NC scanned copies of the EC
approval will be sent altogether to the PI prior to the initiation of the study.
(3) Assist with the translation of the study protocol/CRF where required.
(4) Ensure good communication with the participating sites in the respective
country and to animate local investigators to achieve optimal recruitment and
follow up during the period of the study. During the period of database quality
control (data ‘cleaning’) the NC should animate the individual to reply in possible
queries. (encourage multiple centers to collaborate and purchase ethics committee
approval at national level if relevant).

Local co-ordinators
Local co-ordinators in individual institutions will have the following responsibilities:
(1) Provide leadership for the project in their institution
(2) Ensure all relevant regulatory approvals are in place and communicated with
the coordinating center
(3) Ensure adequate data collection and act as guarantor for the integrity and
quality of the data
(4) Ensure timely completion of the e-CRFs
(5) Ensure collaboration to solve possible queries that may arise during the
database quality control process.

3 Background
Complicated intra-abdominal infection (IAI) is a frequent cause of sepsis and septic
shock in critically ill patients. According to a large point-prevalence study 51% of all
intensive care unit patients experience infection and of these, 19% concerns an intra-
abdominal infection [1]. Abdominal sepsis is a severe infectious complication associated
with considerable mortality ranging on average 30% to 60%, thereby carrying a higher
burden compared with sepsis originating from other sources [2,3]. Abdominal sepsis is a
particular clinical challenge as IAI s differ from other infections because of (i) the broad
spectrum in type of infection and disease severity (from uncomplicated appendicitis
cases to diffuse peritonitis caused by ischaemic bowel perforations)[4], (ii) the crucial role
of surgery in the management of IAI [5,6], and (iii) the broad variety of potential
pathogenic organisms and the equivocal sense of per-operative culture results [7,8,9]. As in other infections the on-going emergence of multidrug resistance might complicate antimicrobial therapy, however, it is uncertain to which extent risk factors for multidrug resistance in severe pneumonia – such as recent antibiotic exposure and length of hospitalization – are valid for cases of IAI [10,11]. Despite the fact that IAIs are a frequent cause of morbidity, large epidemiological series are scarce and generally limited to single centre reports [12] or regional initiatives [13]. As such, the broader picture of the epidemiology of IAI remains unexplored.

4 Objectives

The aim of the project is to perform a multinational, prospective, observational study on IAIs in critically ill patients; special emphasis will be given to epidemiology and outcomes.

More specific objectives of the study are:

- To investigate *microbiology* and/or *drug resistance* patterns related to:
  - Geographical region
  - Source of IAI
    - Upper GI tract perforation (stomach & duodenum)
    - Lower GI tract perforation (jejunum, ileum, colon, rectum)
    - Primary peritonitis
    - Peritoneal dialysis-related peritonitis
    - Intra-abdominal abscess
    - Pancreatic infection
    - Biliary tract infection
    - Typhlitis
    - Toxic megacolon
  - Origin of IAI
    - community-acquired
    - early-onset healthcare-associated
    - late-onset healthcare-associated
• To describe physician’s *antimicrobial prescription patterns* related to a classification grid that stratifies IAIs according to disease expression, community or healthcare origin, and anatomical disruption.

• To investigate *outcomes* (clinical response, need for surgical revision, length of hospitalization, and mortality) related to:
  - Classification of IAI (grid as described in reference 10)
  - Severity of acute illness at time of diagnosis (SOFA score) and clinical response after 48-72 hrs. (Δ SOFA score)
  - Processes of care
    - Time to 1st antimicrobial dose
    - Time to source control
    - Type of source control intervention (laparotomy, percutaneous drainage, high volume peritoneal lavage, restoration of anatomy and function)
    - Need for (unplanned) surgical revision (uncontrolled infection source)
    - Frequency of microbiological sampling and delay of results
  - Pathogens involved and empirical antimicrobial coverage; special emphasis will be given, to coverage of multidrug resistant *Enterobacteriaceae*, *Pseudomonas aeruginosa*, enterococci and *Candida* species.
  - Duration of antimicrobial therapy
  - Underlying conditions

5 Methods

5.1 Study design

Prospective, multicentre, observational cohort study
5.2 Ethics / IRB review

As this is an observational study ethics or IRB approval may not be required in all participating countries or sites. Centers will not be permitted to record data unless ethics approval or an equivalent waiver is in place. Each individual site is responsible for appropriate materials for ethics board or IRB review. The necessity of an informed consent is left at the discretion of the local ethics committee.

5.3 ICU selection criteria

All ICUs caring for patients with intra-abdominal infections or peritonitis can apply for participation in the AbSeS project considering the following requirements: (i) ICUs must agree to collect unit and patient related data on site; (ii) ICUs agree to transfer the collected data to the head investigators of the AbSeS project; (iii) ICUs must pursue and obtain ethics committee approval.

5.4 Patient selection

All consecutive, adult ICU patients diagnosed with IAI (either as a primary diagnosis or as a complication during the ICU course) during a 6 months period and with a maximum of 15 cases per unit.

5.5 Inclusion criteria

- Adult (≥18 yrs. of age)
- IAI treated with percutaneous or surgical procedure
- ICU admission (the patient should either be admitted to the ICU because of abdominal sepsis or should be admitted in the ICU for other reasons and subsequently developed abdominal sepsis as a complication during the ICU course)
- Informed consent (if required by local ethics committee)

5.6 Start and duration of the study

The study will start in January 2016 and will (most probably) last for 6-9 months (depending on the inclusion rate). A maximum of 15 cases per ICU can be included.
5.7 Data collection

Data will be recorded through the study website. At the time of registering for the study the local investigator must fill out a **Unit-based Questionnaire** that explores main characteristics of the unit. For each patient included, data will be recorded through an electronic (web-based) **Case Report Form** (e-CRF). Patient data will be **anonymous**. However, each patient is allocated a number, mentioned on the e-CRF. The attending physician (and local principal investigator (PI)) will keep a **decoding list** linking the patient number on the e-CRF with the name of the patient. The PI will keep this decoding list until six months after inclusion stop. As such, the original patient files can be consulted by the PI should any queries arise during the data-cleaning phase.

5.8 Data recorded

Data recorded in the e-CRF include demographics, assessment of severity of acute illness and underlying disease, data on processes of care (timing of surgical intervention, technique of source control, timing of perioperative antibiotic prophylaxis, sampling of perioperative culture, ...), empiric and targeted antibiotic therapy, organ support, microbiological data (if available) from blood cultures, perioperative culture and subsequent cultures, and outcomes (surgical revision, length of ICU stay and survival status at discharge).

5.9 Study power

For a risk factor with 15% prevalence in the study cohort, a sample size of **1500 patients** is required (alpha=0.05; Beta>0.80) for an outcome difference of 10% (45% vs. 35%) to be statistically significant.

According to EPIC2 study 10.1% of critically patients experience an abdominal infection during their ICU stay. Assuming that an average of 200 patients are admitted to an ICU during the 6 month study period, 20 patients are likely to present with abdominal sepsis. Therefore, the maximum number of inclusions (n=15) must be achievable in the majority of centres and the collaboration of 100 ICUs might, mathematically, be appropriate. Notwithstanding, we aim to include **150 ICUs** as we anticipate that patient inclusion will be suboptimal in half of the participating centres (75 ICUs including 15 cases + 75 ICUs including 8 cases = 1725 cases), and that approximately a 10% proportion of cases
(n=175) will be excluded because of missing data in the e-CRFs. This adds to the following estimate:

- 75 ICUs including the maximum number of cases (n=15): 1125 cases
- 75 ICUs including suboptimal (8 cases/unit): 600 cases
  **Subtotal:** 1725 cases
- Minus 10% excluded for incomplete data: -175 cases
  **Total:** 1550 cases

With the AbSeS project being accepted as a Trials Group Study by the ESICM, it is very likely that the above-mentioned figures of participating ICUs and patient inclusions will be exceeded.

5.10 Practical aspects

The following organisational steps are to be taken before the start of the study:

- A steering committee is established and includes international experts in the field of sepsis, intra-abdominal infection, or infectious diseases in critically ill patients.
- A monitoring committee will be established to validate data and to contact local investigators if needed.
- A network of study coordinators will be established (one per country). National coordinators will obtain IRB approval and must recruit study centres.

The AbSeS project is endorsed as a Clinical Trials Group study by the ESICM. ESICM aims to foster collaborative research among its members and to promote Intensive Care Research in Europe and abroad.

5.11 Publication plan

Study results will be presented and disseminated in a timely manner. The executive committee will appoint a writing committee to draft the scientific report(s). All national representatives and local coordinators will have their efforts recognized by being mentioned as ‘collaborator’ in the authorship of the paper and as such listed in PUBMED. Members of the executive committee, national representatives and local coordinators may suggest research questions for secondary manuscripts and take
initiative in drafting the paper after approval by the head investigators. In this regard, the head investigators control the risk of potential overlap between manuscripts.

6 References

Appendix 1: Center Report Form

Center Report Form
To be filled out prior to patient inclusion

Institution (name): ...........................................................................................................

Type of hospital: □ University/academic    □ Non-university

Hospital capacity: ________ beds

Type of ICU: □ Closed    □ Open (non-ICU doctors may write orders)

ICU beds: ________ beds

Number of patients admitted to the ICU in 2014 (approximately): ________ patients

ICU speciality:

Surgical: □ cardiac    □ non-cardiac    □ transplantation

□ mixed    □ burns    □ trauma

Medical □ coronary    □ neurologic    □ respiratory    □ mixed

Mixed medical / surgical    □

Other    □

Availability of an infectious diseases specialist □ no

□ consultant only

□ an ICU clinician is qualified in ID

Availability of a general surgical team □ no

□ only in hospital during day time

□ in hospital day and night

Availability of an antibiotic policy committee □ yes

□ no

Availability of written recommendations on peri-operative antimicrobial prophylaxis □ yes

□ no
Appendix 2: Case Report Form

Case Report Form

Patient ID: ____________ (the patient ID consists out of: site number_rank number)
Please enter on each page of the CRF

Inclusion Criteria:

☐ Adult patient (≥18 years of age)

☐ Hospitalized in an ICU. The abdominal sepsis can be either the principal diagnosis leading to ICU admission or a complication during the ICU course. Abdominal sepsis may be either community- or healthcare-associated.

☐ Infection of abdominal origin (one of the following):

☐ Primary peritonitis
☐ Secondary peritonitis
☐ Tertiary peritonitis
☐ Peritoneal dialysis-related peritonitis
☐ Intra-abdominal abscess
☐ Biliary tract infection
☐ Pancreatic infection
☐ Typhlitis
☐ Toxic megacolon
Section 1 – Demographics

Date of birth (day/month/year): ___

Age (years): _______ (18 - 100 yrs)  SAPS II points:

<40 yrs: 0 points
40 – 59 yrs: 7
60 – 69 yrs: 12
70 – 74 yrs: 15
75 – 79 yrs: 16
>79 yrs: 18

Gender: □ Male □ Female

Weight (kg): ____________ (30 – 180kg)  measured □ estimated □

Height (m): ____________ (1.30 – 2.20m)  measured □ estimated □
Section 2 – Admission data

2.1. Date of hospital admission (day/month/year): __ ___ ___

2.2. Date of ICU admission (day/month/year): __ ___ ___

2.3. Admission source: □ other acute care hospital
   admission date referring centre (day/month/year): __ ___ ___
   □ emergency room
   □ operating room
   □ general ward
   □ other

2.4. Type of admission:
   □ medical (SAPS II points: 6)
   □ surgical  □ elective (SAPS II points: 0)
   □ emergency (SAPS II points: 8)
   □ burns (SAPS II points: 6)
   □ trauma (SAPS II points: 8)

2.5. Primary and secondary diagnoses
   Principal diagnosis leading to ICU admission (only 1, see codes list):
   __ __ __

   Secondary diagnoses; present prior to or at the day of abdominal infection (max. 3, see codes list):
   __ __ __
   __ __ __
   __ __ __

Description: The acute disease should be recorded for all patients, independent of the surgical status. It is the acute (or acute on chronic) disease that best explains the reason(s) for admission. It can be medical or surgical. Only one choice is possible for the primary diagnosis. Up to three secondary diagnoses can be reported on the case report form.

2.6. Underlying conditions (possible to calculate Charlson Comorbidity Index, J Chron Dis 1987)
   □ chronic pulmonary disease
   □ COPD (GOLD stage III or IV)
   □ other
   □ AIDS (not just HIV positive)
   □ malignancy
      □ cancer (solid tumor)
      □ metastatic cancer
- hematologic cancer
- neurological disease
  - cerebrovascular disease
  - dementia
  - hemiplegia
- peptic ulcer disease
- liver disease
  - portal hypertension
  - hepatic cirrhosis

Modified Child-Pugh classification:
- Ascites: □ none □ mild □ moderate/severe
- Encephalopathy: □ none □ mild □ moderate/severe
- Bilirubin (µmol/L): □ <34 □ 35-50 □ >50
  or bilirubin (mg/dL): □ <2.0 □ 2.0-2.9 □ >2.9
- Albumin (g/L): □ >35 □ 28-35 □ <28
- Prothrombin time (seconds over normal): □ <4 □ 4-6 □ >6

- chronic renal failure
  - mild: GFR ≥60 mL/min.
  - moderate: GFR 30 – 59 mL/min.
  - severe: GFR 15 – 29 mL/min.
  - end-stage: GFR <15 mL/min. or requiring renal replacement therapy
- chronic heart failure (NY Heart Association class IV)
- peripheral vascular disease
- diabetes mellitus
  - without end-organ damage (excludes diet controlled alone)
  - with end-organ damage (retinopathy, neuropathy, nephropathy, brittle diabetes)
- immunosuppressed status (check all that apply)
  - neutropenia (<1000 neutrophils/mm³)
  - corticosteroid therapy (prednisolone or equivalent >0.5 mg/kg/day for >3 months)
  - chemotherapy within one year
  - radiotherapy within one year
  - bone marrow recipient
  - solid organ transplant recipient
  - immunosuppressive drug for auto-immune diseases
  - congenital immunodeficiency
- connective tissue disease
- life style risk factors
  - malnutrition (BMI<18)
  - obesity (BMI>30)
- tobacco use (>20 pack years)
- alcohol abuse (>1L of wine /day or equivalent = 10g alcohol day)
- IV drug abuse

### 2.7. Severity of acute illness at ICU admission (SAPS II-score, JAMA 1993)

**Heart rate (bpm)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>11</td>
</tr>
<tr>
<td>40-69</td>
<td>2</td>
</tr>
<tr>
<td>70-119</td>
<td>0</td>
</tr>
<tr>
<td>120-159</td>
<td>4</td>
</tr>
<tr>
<td>≥160</td>
<td>7</td>
</tr>
</tbody>
</table>

**Core body temperature (min.) ___ - ___ (max.) ___ - ___ °C**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;39°C</td>
<td>0</td>
</tr>
<tr>
<td>≥39°C</td>
<td>3</td>
</tr>
<tr>
<td>&lt;102.2°F</td>
<td>0</td>
</tr>
<tr>
<td>≥102.2°F</td>
<td>3</td>
</tr>
</tbody>
</table>

**Therapeutic hypothermia**

- yes
- no

**Systolic blood pressure (mmHg)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;70</td>
<td>13</td>
</tr>
<tr>
<td>70-99</td>
<td>5</td>
</tr>
<tr>
<td>100-199</td>
<td>0</td>
</tr>
<tr>
<td>≥200</td>
<td>2</td>
</tr>
</tbody>
</table>

**Mechanical ventilation**

- yes
- no

**Non-invasive ventilation**

- yes
- no

**PaO₂/FiO₂**

- <100 (11 points)
- 100-199 (9 points)
- ≥200 (6 points)

*Count points only if on mechanical ventilation (invasive or non-invasive).*

**Blood urea** (mg/dL) or (mmol/L) or BUN (mg/dL)

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.6</td>
<td>0</td>
</tr>
<tr>
<td>0.6 - 1.79</td>
<td>6</td>
</tr>
<tr>
<td>≥1.80</td>
<td>10</td>
</tr>
<tr>
<td>&lt;10</td>
<td>0</td>
</tr>
<tr>
<td>10 - 29.9</td>
<td>6</td>
</tr>
<tr>
<td>≥30</td>
<td>10</td>
</tr>
<tr>
<td>&lt;28</td>
<td>0</td>
</tr>
<tr>
<td>28 - 83</td>
<td>6</td>
</tr>
<tr>
<td>≥84</td>
<td>10</td>
</tr>
</tbody>
</table>

**Leucocytes (cells/ml) (min.) ___ - ___ (range 300-400000) (max.) ___ - ___ (range 300-400000)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1000</td>
<td>12</td>
</tr>
<tr>
<td>1000-199000</td>
<td>4</td>
</tr>
<tr>
<td>≥200000</td>
<td>3</td>
</tr>
</tbody>
</table>

**Urine output (mL/24hours)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;500</td>
<td>11</td>
</tr>
<tr>
<td>500-1000</td>
<td>4</td>
</tr>
<tr>
<td>&gt;1000</td>
<td>0</td>
</tr>
</tbody>
</table>

**Serum potassium (mEq/L)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>3</td>
</tr>
<tr>
<td>3 - 4.9</td>
<td>0</td>
</tr>
<tr>
<td>≥5</td>
<td>3</td>
</tr>
</tbody>
</table>

**Serum sodium (mEq/L)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;144</td>
<td>1</td>
</tr>
<tr>
<td>125 - 144</td>
<td>0</td>
</tr>
<tr>
<td>&lt;125</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total bilirubin (indicate max. value)**

- mg/dL
  - <4 (0 points)
  - 4 - 5.9 (4 points)
  - ≥6 (9 points)
- µmol/L
  - <68.4 (0 points)
  - 68.4 - 102.5 (4 points)
  - ≥102.6 (9 points)

**Serum bicarbonate (mEq/L)(indicate min. value)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15</td>
<td>6</td>
</tr>
<tr>
<td>15 - 19</td>
<td>3</td>
</tr>
<tr>
<td>≥20</td>
<td>0</td>
</tr>
</tbody>
</table>

**Glasgow Coma Score ___ - ___ (range 3 – 15) (effective if not sedated, estimated if sedated)**

<table>
<thead>
<tr>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6</td>
<td>26</td>
</tr>
<tr>
<td>6 - 8</td>
<td>13</td>
</tr>
<tr>
<td>9 - 10</td>
<td>7</td>
</tr>
<tr>
<td>11 - 13</td>
<td>5</td>
</tr>
<tr>
<td>14 - 15</td>
<td>0</td>
</tr>
</tbody>
</table>
2.8 Miscellaneous risk factors – information required to determine community or healthcare-associated onset of sepsis (check all that apply)

- Nursing home resident
- Out of hospital parenteral nutrition or vascular access
- Chronic dialysis
- Hospital admission in the past 6 months
- Antibiotic therapy in the past 6 months
Section 3 - Diagnosis of abdominal infection

Date of diagnosis (day/month/year): __ __ __

Time of diagnosis (hh:mm; use 24 hrs clock): __ : __ (for the time of diagnosis, indicate the time of clinical suspicion of IAI.)

3.1. Diagnostic tools (check all that apply; specific microbiological investigation is mentioned later on, section...)

- Clinical investigation (palpation, auscultation)
- Abdominal ultrasound
- Abdominal CT-scan
- Diagnostic peritoneal lavage
- Puncture / trans-abdominal fine-needle aspiration
- Explorative laparoscopy
- Explorative laparotomy

3.2. Anatomical disruption (check only one)

- Without perforation
- Localized peritonitis
  - upper GI tract perforation (stomach & duodenum)
  - lower GI tract perforation (jejunum, ileum, colon, rectum)
- Diffuse peritonitis


- Primary peritonitis (also referred to as spontaneous bacterial peritonitis) is defined as a microbial infection of the peritoneal fluid in the absence of a gastrointestinal perforation, abscess, or other localized infection within the gastrointestinal tract.
Peritoneal dialysis-related peritonitis is defined as microbial infection of the peritoneal fluid in patients treated with peritoneal dialysis, in the absence of indicators for gastrointestinal perforation (high peritoneal fluid leukocyte count, failure to clear with antimicrobials, …).

Secondary peritonitis is a microbial infection of the peritoneal space following perforation, abscess formation, ischemic necrosis, or penetrating injury of the intra-abdominal contents.

Tertiary peritonitis is defined as persistent intra-abdominal inflammation and clinical signs of peritoneal irritation following secondary peritonitis from nosocomial pathogens.

Intra-abdominal abscess is a pocket of infected fluid and pus located within the peritoneal space or surrounding structures. There may be more than one abscess.

- single abscess
- multiple abscess formation

Location (free text): __ __ __

Biliary tract infection is an acute inflammatory process of the biliary tract or surrounding structures as evidenced by either (i) the isolation of pathogenic microorganisms obtained via percutaneous or direct surgical collection of samples in the lumen of the gall bladder or the biliary tract or the blood, or (ii) surgical or radiographic evidence of suppurative complications.

Pancreatic infection is defined as infection in the pancreas, following acute mostly necrotizing pancreatitis or infection of a structural abnormality such as a pseudocyst (as complication of chronic pancreatitis).

Typhlitis is defined as transmural inflammation and variable degrees of necrosis and infection of the cecum and colon found in immunocompromized hosts (primarily in neutropenic patients and HIV-infected patients).

Toxic megacolon is defined as an acute dilation of the colon due to diffuse inflammation or necrosis of the bowel wall in the absence of mechanical obstruction.
Section 4 – Microbiology

4.1. Microbiology at time of diagnosis/surgery

4.1.1. Perioperative cultures

☐ not applicable, no peri-operative cultures are sampled
☐ check box if patient already received empiric antimicrobial therapy prior to culture sampling

Type of sampling:
☐ histology
☐ swab
☐ peritoneal fluid
☐ peritoneal rinse fluid

Culture results:

…

4.1.2. Trans-abdominal fine-needle aspiration

☐ not applicable, no peri-operative cultures are sampled
☐ check box if patient already received empiric antimicrobial therapy prior to culture sampling

Culture results:

…

4.1.3. Blood cultures

☐ not applicable, no peri-operative cultures are sampled
☐ check box if patient already received empiric antimicrobial therapy prior to culture sampling

Culture results:

…

4.1.4. Cultures sampled from abdominal drains within 24 hrs. post surgery

☐ not applicable, no peri-operative cultures are sampled
☐ check box if patient already received empiric antimicrobial therapy prior to culture sampling

Culture results:

…
4.2. Additional microbiological results during the course of the abdominal infection - Cultures sampled from abdominal drains are not considered

☐ peri-operative (during surgical revision)
   Date of culture sampling (day/month/year): ___ ___ ___
   Culture result: …

☐ trans-abdominal fine-needle aspiration
   Date of culture sampling (day/month/year): ___ ___ ___
   Culture result: …

☐ blood culture
   Date of culture sampling (day/month/year): ___ ___ ___
   Culture result: …
## Section 5 – Anti-infective approach

### 5.1. Antimicrobial therapy

<table>
<thead>
<tr>
<th>Drug name (generic)</th>
<th>Dose / day</th>
<th>Route (cf. menu)</th>
<th>Date and time of the first dose</th>
<th>Date of the last dose</th>
<th>Type of prescription (cf. menu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1: ceftazidime</td>
<td>Loading: 2g Maintenance: 6g Enter 8g</td>
<td>2</td>
<td>01/03/2009 13:00</td>
<td>03/03/2009</td>
<td>2</td>
</tr>
<tr>
<td>Example 2: meropenem</td>
<td>Loading: - Maintenance: 4×1g Enter 4g</td>
<td>1</td>
<td>03/03/2009 14:00</td>
<td>10/03/2009</td>
<td>3</td>
</tr>
</tbody>
</table>

**Menu:**

**Route:**
(1) intravenous – intermittent;
(2) intravenous – continuous infusion or extended infusion;
(3) oral;
(4) intratracheal;
(5) intramuscular;

**Type of prescription**
(1) empirical therapy based on sepsis without knowledge of previous colonization;
(2) empirical therapy based on previous patient’s colonization;
(3) targeted therapy based on the microbiological results
Infectious problems not related to the abdominal sepsis requiring antimicrobial therapy:

- ☐ community-acquired pneumonia
- ☐ healthcare-associated pneumonia
- ☐ ventilator-associated pneumonia
- ☐ bloodstream infection
- ☐ urinary tract infection / pyelonephritis
- ☐ central nervous system infection
- ☐ surgical site infections / soft tissue infections
- ☐ osteomyelitis
- ☐ other

5.2. Source control

- ☐ none
- ☐ drainage
  - ☐ percutaneous drainage (without surgical intervention)
  - ☐ surgical drainage
  - ☐ high-volume peritoneal lavage during surgery
  - ☐ placement of one or more percutaneous drains
- ☐ debridement of necrotic tissue
- ☐ decompression (to avoid abdominal compartment syndrome or to avoid obstruction of distended bowel)
- ☐ restoration of anatomy and function

5.3. Use of adjunctive therapy for sepsis

Did the patient receive any type of adjunctive therapy for sepsis?

- ☐ no
- ☐ yes, specify:  
  - ☐ immunoglobulins
  - ☐ hydrocortisone (200-300 mg/day)
  - ☐ other: __________________________________________

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Study Protocol & CRF  AbSeS  23/33
Section 6 – Severity of disease assessment: pre-surgery (worst parameters observed at onset of abdominal sepsis within a 6 hrs. time frame before surgery)

6.1. Sepsis grading (tick and complete the severity of sepsis at day of diagnosis)

- **Sepsis** (≥2 systemic inflammatory response criteria):
  - fever (body temperature >38°C or hypothermia (<36°C)
  - tachycardia (heart rate >90/min.)
  - tachypnea (respiratory rate >20/min or PaCO2 <32 mmHg)
  - leucocytosis (white blood cell count >12,000 cells/ L) or leucopenia (>4,000/ L)

- **Severe sepsis – associated organ dysfunctions:**
  - non-invasive mechanical ventilation
  - invasive mechanical ventilation with intubation or tracheotomy
  - acute kidney injury (serum creatinin ≥1.2 mg/dL or 111 µmol/L)
  - acute liver failure (serum bilirubin ≥1.2 mg/dL or 20 µmol/L)
  - acute neurologic failure (Glasgow coma scale ≤14)
  - coagulation disorder (platelet count <150,000 / L)

- **Septic shock – associated hypotension** (systolic blood pressure <90 mmHg unresponsive to fluid administration)

6.2. Organ failure assessment (SOFA-score)

- **Respiratory failure** (PaO2/FiO2)
  - <400
  - <300
  - <200 (with respiratory support)
  - <100 (with respiratory support)

- **Coagulation disorder** (platelet count x 10⁹/L.)
  - <150
  - <100
  - <50
  - <20

Liver failure (bilirubin, mg/dL)
  - 1.2 – 1.9 (or 20 – 33 µmol/L)
  - 2.0 – 5.9 (or 34 – 101 µmol/L)
  - 6.0 – 11.9 (or 102 – 204 µmol/L)
  - ≥12.0 (or ≥204 µmol/L)

Hypotension
  - mean art. pressure <70 mmHg or systolic art. pressure <90 mmHg
  - dopamine ≤5 mcg/kg/min or dobutamine (any dose)
  - dopamine >5 mcg/kg/min or (nor)adrenaline at ≤1 mcg/kg/min
  - dopamine >15 mcg/kg/min or (nor)adrenaline at >0.1 mcg/kg/min

- **Glasgow coma scale** (effective if not sedated, estimated if sedated)
  - 13-14
  - 10-12
  - 6-9
  - <6
6.3. Organ support

- ☐ mechanical ventilation (invasive or non-invasive)
- ☐ inotrop/vasopressor support
- ☐ renal replacement therapy
  - ☐ for acute kidney injury
  - ☐ for removal of inflammatory cytokines/endotoxins

6.4. Miscellaneous

- Lactate (max.) __.__.____ mmol/L
- pH (min.) __.__.____ (range 6.8 – 7.8)
- c-reactive protein __.__.____ mg/L (range 0.02 – 250)
- procalcitonin __.__.____ mcg/L (range 0.05 – 100)
- white blood cell count __.__.____ cells/mcL (range 300 – 40,000)

Intra-abdominal pressure: __.__.____ mm Hg

Indicate method used to measure IAP

- ☐ inferior vena cave  ☐ intra-gastric  ☐ transgastral
- ☐ urinary bladder  ☐ transvesical technique (?)
Section 7 – Severity of disease assessment: early post-surgery
(worst parameters observed within a 24 hrs. time frame after surgery)
☐ Not applicable (no surgical intervention was executed)

7.1. Sepsis grading (tick and complete the severity of sepsis 72 hrs after diagnosis)

☐ Sepsis (≥2 systemic inflammatory response criteria):
  ☐ fever (body temperature >38°C or hypothermia (<36°C)
  ☐ tachycardia (heart rate >90/min.)
  ☐ tachypnea (respiratory rate >20/min or PaCO2 <32 mmHg)
  ☐ leucocytosis (white blood cell count >12,000 cells/mcL) or leucopenia (>4,000/mcL)

☐ Severe sepsis – associated organ dysfunctions:
  ☐ non invasive mechanical ventilation
  ☐ invasive mechanical ventilation with intubation or tracheotomy
  ☐ acute kidney injury (serum creatinin ≥1.2 mg/dL or 111 µmol/L)
  ☐ acute liver failure (serum bilirubin ≥1.2 mg/dL or 20 µmol/L)
  ☐ acute neurologic failure (Glasgow coma scale ≤14)
  ☐ coagulation disorder (platelet count <150,000 / L)

☐ Septic shock – associated hypotension (systolic blood pressure <90 mmHg unresponsive to fluid administration)

7.2. Organ failure assessment (SOFA-score)

  • Respiratory failure (PaO2/FiO2)
    ☐ <400
    ☐ <300
    ☐ <200 (with respiratory support)
    ☐ <100 (with respiratory support)

  • Coagulation disorder (platelet count x 10⁹/L.)
    ☐ <150
    ☐ <100
    ☐ <50
    ☐ <20

  • Liver failure (bilirubin, mg/dL)
    ☐ 1.2 – 1.9 (or 20 – 33 µmol/L)
    ☐ 2.0 – 5.9 (or 34 – 101 µmol/L)
    ☐ 6.0 – 11.9 (or 102 – 204 µmol/L)
    ☐ ≥12.0 (or ≥204 µmol/L)

  • Hypotension
    ☐ mean arterial pressure <70 mmHg or systolic arterial pressure <90 mmHg
    ☐ dopamine ≤5 mcg/kg/min or dobutamine (any dose)
    ☐ dopamine >5 mcg/kg/min or (nor)adrenaline at ≤1 mcg/kg/min
    ☐ dopamine >15 mcg/kg/min or (nor)adrenaline at >0.1 mcg/kg/min
• Glasgow coma scale (effective if not sedated, estimated if sedated)
  □ 13-14
  □ 10-12
  □ 6-9
  □ ≤6

7.3. Organ support
  □ mechanical ventilation (invasive or non-invasive)
  □ inotropic/vasopressor support
  □ renal replacement therapy
    □ for acute kidney injury
    □ for removal of inflammatory cytokines/endotoxins

7.4. Miscellaneous
  Lactate (max.) __ __ . __ mmol/L
  pH __ . __
  c-reactive protein __ __ . __ __ mg/L
  procalcitonin __ __ . __ __ mcg/L
  white blood cell count __ __ __ __ cells/mL
  Intra-abdominal pressure: __ __ __ mm Hg

Indicate method used to measure IAP

  □ inferior vena cave  □ intra-gastric  □ transgastral
  □ urinary bladder  □ transvesical technique
Section 8 – Severity of disease assessment: 72 hrs. post-surgery

☐ Not applicable (no surgical intervention was executed)

8.1. Sepsis grading (tick and complete the severity of sepsis 72 hrs after diagnosis)

☐ Sepsis (≥2 systemic inflammatory response criteria):
  ☐ fever (body temperature >38°C or hypothermia (<36°C)
  ☐ tachycardia (heart rate >90/min.)
  ☐ tachypnea (respiratory rate >20/min or PaCO2 <32 mmHg)
  ☐ leucocytosis (white blood cell count >12,000 cells/ L) or leucopenia (>4,000/ L)

☐ Severe sepsis – associated organ dysfunctions:
  ☐ non-invasive mechanical ventilation
  ☐ invasive mechanical ventilation with intubation or tracheotomy
  ☐ acute kidney injury (serum creatinin ≥1.2 mg/dL or 111 µmol/L)
  ☐ acute liver failure (serum bilirubin ≥1.2 mg/dL or 20 µmol/L)
  ☐ acute neurologic failure (Glasgow coma scale ≤14)
  ☐ coagulation disorder (platelet count <150,000 / L)

☐ Septic shock – associated hypotension (systolic blood pressure <90 mmHg unresponsive to fluid administration)

8.2. Organ failure assessment (SOFA-score)

• Respiratory failure (PaO2/FiO2)
  ☐ <400
  ☐ <300
  ☐ <200 (with respiratory support)
  ☐ <100 (with respiratory support)

• Coagulation disorder (platelet count x 109/L.)
  ☐ <150
  ☐ <100
  ☐ <50
  ☐ <20

• Liver failure (bilirubin, mg/dL)
  ☐ 1.2 – 1.9 (or 20 – 33 µmol/L)
  ☐ 2.0 – 5.9 (or 34 – 101 µmol/L)
  ☐ 6.0 – 11.9 (or 102 – 204 µmol/L)
  ☐ ≥12.0 (or ≥204 µmol/L)

• Hypotension
  ☐ mean arterial pressure <70 mmHg or systolic arterial pressure <90 mmHg
  ☐ dopamine ≤5 mcg/kg/min or dobutamine (any dose)
  ☐ dopamine >5 mcg/kg/min or (nor)adrenaline at ≤1 mcg/kg/min
  ☐ dopamine >15 mcg/kg/min or (nor)adrenaline at >0.1 mcg/kg/min
• Glasgow coma scale (effective if not sedated, estimated if sedated)
  □ 13-14
  □ 10-12
  □ 6-9
  □ <6

8.3. Organ support

□ mechanical ventilation (invasive or non-invasive)
□ inotropic/vasopressor support
□ renal replacement therapy
  □ for acute kidney injury
  □ for removal of inflammatory cytokines/endotoxins

8.4. Miscellaneous

Lactate (max.) __ __ __ mmol/L
pH __ __ __
c-reactive protein __ __ __ mg/L
procalcitonin __ __ __ mcg/L
white blood cell count __ __ __ __ cells/mL

Intra-abdominal pressure (if the patient was operated for abdominal source control, report the post-surgical procedure value) __ __ __ mm Hg

Indicate method used to measure IAP

□ inferior vena cave □ intra-gastric □ transgastral
□ urinary bladder □ transvesical technique
Section 9 - Source control assessment: 7 days after intervention
(day of surgical intervention = day zero)

☐ not applicable (no source control performed/required)

Is adequate source control achieved?
☐ Yes, no signs of perforation or persistent inflammation are present
☐ No, signs of persistent inflammation are present but no surgical revision has been executed
☐ No, the patient required additional surgical intervention because of:
  ☐ anastomotic leakages, perforation
  ☐ intestinal obstruction
  ☐ abdominal compartment syndrome (decompressive laparotomy)
  ☐ haemorrhage
  ☐ other

Date of 1st surgical revision: (day/month/year): ___ ___ ___

Number of surgical interventions during the first week: ___ ___
Section 10 – Outcome (28-day follow up)

☐ Additional surgical intervention for abdominal sepsis (later than those mentioned within the first 7 days following initial source control procedure; section 9)

Number of surgical interventions during the first week: __ __

Stop antimicrobial therapy (for abdominal sepsis): (day/month/year): __ __ __
☐ not applicable (ongoing)

ICU discharge: (day/month/year): __ __ __
☐ not applicable (ongoing)

Organ support during ICU stay
☐ mechanical ventilation (invasive or non-invasive)
☐ inotrop/vasopressor support
☐ renal replacement therapy
☐ for acute kidney injury
☐ for removal of inflammatory cytokines/endotoxins

Survival status
☐ alive
☐ death

Death related to abdominal sepsis (clinical judgement)
☐ yes
☐ uncertain
☐ no (other complication likely to cause death)
**Appendix 3 - Codes list admission diagnosis (2.5.)**

**PRIMARY and SECONDARY DIAGNOSES**

**Description:** The primary and maximally 3 secondary diagnoses (acute or acute on chronic disease) should be recorded for all patients as they best reflect the reason(s) for ICU admission.

### 100 Neurological:
- **101** Stroke by ischemic or haemorrhagic mechanism (non-traumatic)
- **102** Intracerebral hemorrhage
- **103** Subarachnoid hemorrhage
- **104** Neurologic infection
- **105** Neurologic neoplasm
- **106** Neuromuscular disease
- **107** Dementia
- **108** Seizures
- **109** Polyneuritis and polyradiculoneuritis: includes polyneuritis due to infection, inflammation, toxic, Guillain-Barré syndrome
- **110** Post-anoxic coma
- **111** Delirium tremens
- **112** Spinal cord surgery
- **113** Other

### 200 Respiratory:
- **201** Exacerbation of chronic pulmonary disease (either obstructive or non obstructive)
- **202** Asthma attack
- **203** Pulmonary embolism
- **204** Pleural effusion
- **205** Mechanical airway obstruction
- **206** Inhalation pneumonitis: induced by gastrointestinal contents, blood, smoke, and/or gases
- **207** Respiratory neoplasm (include larynx and trachea)
- **208** Respiratory arrest
- **209** Pulmonary edema (non-cardiogenic)
- **210** Community-acquired bacterial pneumonia
- **211** Healthcare-associated bacterial pneumonia
- **212** Viral pneumonia
- **213** Fungal pulmonary infection
- **214** Near-drowning
- **210** Other

### 300 Cardiovascular / vascular:
- **301** Acute myocardial infarction
- **302** Unstable angina
- **303** Cardiac arrest
- **304** Cardiopathy: includes ischemic, valvular, hypertensive, alcoholic and other, non-infectious forms
- **305** Cardiogenic shock
- **306** Congestive heart failure
- **307** Rhythm disturbance
- **308** Perivascular disease
- **309** Hypertension
- **310** Aortic aneurysm
- **311** Dissecting/ruptured aorta
- **312** Elective abdominal aneurysm repair
- **313** Peripheral vascular surgery
- **314** Valvular heart surgery
- **315** CABG
- **316** Peripheral artery bypass graft
- **317** Carotid endarterectomy
- **318** Endocarditis
- **319** Other
400 Renal/genito-urinary tract:
  401 Acute kidney injury
  402 Chronic renal failure
  405 Renal neoplasia
  406 Non-malignant gynaecological diseases, non-malignant: lesions of ovary, uterus, cervix, vulvae, vagina not due to neoplasia
  407 Malignant gynaecological diseases
  408 Urosepsis
  409 Other

500 Hematological:
  501 Transfusion reaction
  502 Neutropenia
  503 Neutropenic sepsis
  504 Thrombocytopenia, coagulopathy
  503 Non-malignant disease (e.g. anaemia, aplastic anaemia, methemoglobinemia, congenital disorders of blood coagulation factors)
  504 Malignant disease: lymphoma, acute leukaemia and multiple myeloma
  505 Other

600 Digestive:
  601 Hepatic failure
  602 Gastro-intestinal perforation/obstruction/rupture
  603 Gastro-intestinal bleeding due to varices, ulcer or diverticulitis
  604 Inflammatory disease (ulcerative colitis, crohn’s disease)
  605 Neoplasia of the upper digestive tract (oesophageal, gastric or duodenal)
  606 Neoplasia of the lower digestive tract (colon and rectum)
  607 Pancreatitis
  608 Other

700 Metabolic:
  701 Drug overdose, intoxication
  702 Diabetic ketoacidosis
  703 Metabolic coma
  704 Endocrinopathy
  705 Other

800 Pregnancy-related:
  801 Eclampsia, preeclampsia
  802 HELLP syndrome
  803 Delivery haemorrhage
  804 Other

900 Trauma & skin:
  901 Head trauma (isolated)
  903 Polytrauma, without brain trauma
  904 Polytrauma, with brain trauma
  905 Spinal cord injury
  905 Burn injury
  907 Skin lesions requiring intensive care, non-traumatic (e.g. toxic epidermal necrolysis)
  908 Pressure ulcer requiring surgical debridement or extensive wound care
  909 Severe surgical wound infection
  910 Other

000 Other diseases