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Supplement 1 Diagnostic criteria for postoperative adverse events

New-onset atrial fibrillation

New-onset atrial fibrillation was defined both electro-physiologically and clinically as recommended by the American Association for Thoracic Surgery: Electrocardiograms(ECG) recordings which demonstrate characteristics atrial fibrillation findings for at least 30 seconds or for the entirety of the ECG if shorter than 30 seconds; clinically significant atrial fibrillation which requires treatment with heart beat rate or rhythm control agents, anticoagulants or increases hospital stay.

Whether the ECG recording indicated new-onset atrial fibrillation was determined by a cardiologist.

Blood transfusion

The patient receives blood transfusion (including blood component transfusion) after transferred to the ICU ward or general ward.

Abdominal distention

Patients feel bloated, and needs medication.

Constipation

The patient has difficulty defecating or does not defecate for three days or needs medication to defecate.

Acute kidney injury

Meet any of the following conditions

Serum creatinine concentration level is found to be $\geq 50\%$ increased from baseline within 7days.

Serum creatinine concentration level increase of at least 0.3mg/dl (426.5mmol/l) within 48 hours.

Urine volume of less than 0.5ml/kg/h for 6 hours

Vomiting

Patient vomiting gastric contents

Nausea

Patients feel nauseous and needs medication.

Headache

The patients have a headache (whether medication is needed or not).

insomnia

Patient complains of insomnia, or reduction nightly sleep time (whether medication is needed or not).

Heart failure

Clinical manifestations: dyspnea, cough with pink foamy sputum, etc.

Cardiogenic shock: Hypotension (Systolic blood pressure<90mmHg) occurs with sufficient blood volume,

accompanied by tissue hypoperfusion

Plasma level of brain natriuretic peptides (BNP) Increased.

Nightmare

Patient self-complaint that the incidence of nightmares is higher than before surgery.

Incision infection

Infection in surgical incision or incision at drainage tube.

ICU re-entry

As described above.

Ventricular fibrillation

Electrocardiograms (ECG) recordings which demonstrate characteristics Ventricular fibrillation findings

Whether the ECG recording indicated ventricular fibrillation was determined by a cardiologist.

Supplement 2 Postoperative pulmonary complications score

Postoperative pulmonary complications score	
Grade 1	<p>Cough, dry</p> <p>Microatelectasis: abnormal lung findings and temperature $> 37.5^{\circ}\text{C}$ without other documented cause; normal chest radiograph</p> <p>Dyspnea, not due to other documented cause</p>
Grade 2	<p>Cough, productive, not due to other documented cause</p> <p>Bronchospasm: new wheezing or pre-existent wheezing resulting in a change in therapy</p> <p>Hypoxemia ($\text{SpO}_2 \leq 90\%$) at room air</p> <p>Atelectasis: gross radiological confirmation (concordance of 2 independent experts) plus either temperature $> 37.5^{\circ}\text{C}$ or abnormal lung findings</p> <p>Hypercarbia ($\text{PaCO}_2 > 50 \text{ mmHg}$), requiring treatment</p>
Grade 3	<p>Pleural effusion, resulting in thoracentesis</p> <p>Pneumonia: radiological evidence (concordance of 2 independent experts) plus clinical symptoms (two of the following: leucocytosis or leucopenia, abnormal temperature, purulent secretions), plus either a pathological organism (by Gram stain or culture), or a required change in antibiotics</p> <p>Pneumothorax</p> <p>Noninvasive ventilation, strictly applied to those with all of the following: a) oxygen saturation (SpO_2) lower than 92% under supplemental oxygen; b) need of supplemental oxygen $> 5 \text{ L/min}$; and $\text{RR} \geq 30 \text{ bpm}$</p> <p>Re-intubation postoperative or intubation, period of ventilator dependence (non-invasive or invasive ventilation) $\leq 48 \text{ hours}$</p>
Grade 4	<p>Ventilatory failure: postoperative ventilator dependence exceeding 48 hours, or reintubation with subsequent period of ventilator dependence exceeding 48 hours</p>
Grade 5	<p>Death before hospital discharge</p>
* We only classified as grade 2 if two or more items in the grade 2 were present.	