Intensive Care Unit Acquired Infection as a Side Effect of Sedation

Essay
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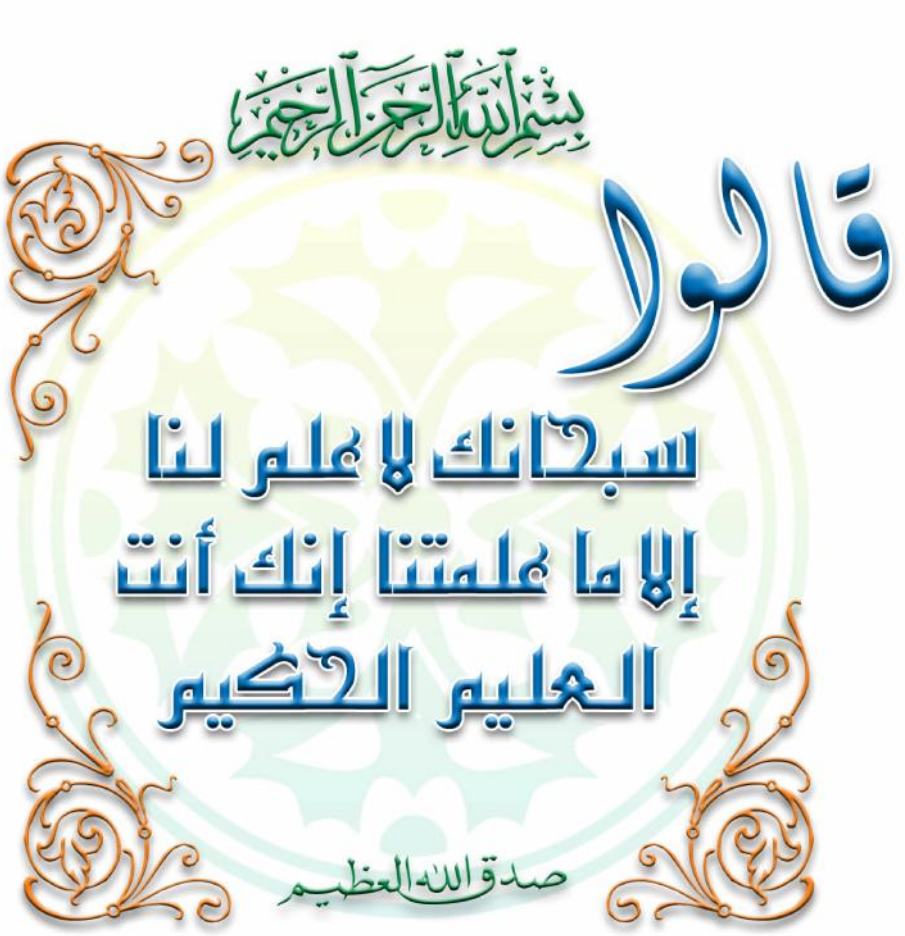

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Nermen Abdel Atty Elsayed

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List of Abbreviations

Abb.	Meaning
γ IFN	γ interferon.
6 MAM	6 mono-acetyl-morphine
AIDs	Acquired immune deficiency.
ARDS	Acute respiratory distress syndrome.
B.d	Twice a day.
BSIs	Blood stream infections.
BZD	Benzodiazepines.
Ca+2	Calcium.
CAUTI	Catheter-associated urinary tract infection.
cGMP	Cyclic guanosine mono phosphate.
CIVS	Continuous intravenous sedation.
CLP	Cecal ligation and puncture.
CMBC	Concentration of moving blood cells.
CMRO2	Cerebral metabolic rate for oxygen consumption.
CNS	Central nervous system.
CO	Cardiac output.
CPIS	Clinical pulmonary infection score.
CVS	Cerebro-vascular infection.
DIS	Daily interruption of sedative infusions.
ECT	Electro convulsive therapy.
EENT	Eyes, ears, nose, throat.
ESBIs	Extended spectrum beta lactamases.
GABA	γ amino butyric acid.

Abb.	Meaning
GI	Gastrointestinal infection.
HCV	Hepatitis C virus.
HFO	High frequency oscillatory ventilation.
HIV	Human immunodeficiency virus.
HR	Heart rate.
ICU	Intensive care unit.
IgE	Immune-globins E.
IL-2	Interleukin 2.
IV	Intravenous.
IVDR-BSI	Intra vascular devices related blood stream.
IVDs	Intra vascular devices.
K+1	Potassium.
LDF	Laser Doppler flow meter.
LPS	Lipo-poly saccharide.
LRT	Lower respiratory infection.
LTAC	Long term acute care.
LTCFs	Long-term care facilities.
M6G	Morphine-6-glucuronide.
MAP	Mean arterial pressure.
MDR	Multi-drug resistance.
MODS	Multi-organ dysfunction syndrome.
MRSA	Methicillin-resistant staph. aurous.
NIRS	Near infra-red spectroscopy.
NIs	Nosocomial infections.
NK	Natural killer.
NMDA	N-methyl-D-aspartate.

Abb.	Meaning
NNIS	National nosocomial infection surveillance system.
NO	Nitric oxide.
OPRD1	Opioid receptor D1.
OPRM1	Opioid receptor M1.
OPS	Orthogonal polarization spectral imaging technique.
OT	Occupational therapy-orthopedic therapy.
PBR	Peripheral benzodiazepine receptor.
PNE	Pneumonia.
PT	Physical therapy.
PU	Perfusion units.
REM	Rapid eye movement.
ScvO2	Central venous o2 saturation.
SDF	Side stream sark- field imaging technique.
SIRS	Systemic inflammatory response syndrome.
SIV	Simian immune deficiency virus.
SPP	Species.
SSI	Surgical site infection.
SSTI	Soft tissue infection.
STO2	Tissue oxygen saturation.
T.i.d	Three times daily.
T1/2	Half life of drugs.
TCI	Target-controlled infection.
TNF	Tumor necrosis factor.
USA	United state of America.

Abb.	Meaning
UTIs	Urinary tract infections.
VAP	Ventilator associated pneumonia.
VILI	Ventilator induced lung injury.
VRE	Vancomycin resistant enterococci.

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Introduction

Healthcare–associated infections are the most common complications affecting hospitalized patients. ICU acquired infections represent the majority of these infections. In a recent multi-center study conducted in 71 adult ICUs, 7.4 % of patients had an ICU acquired infection. ***(Burke, 2003)***

ICU acquired pneumonia (47%) and ICU acquired blood stream infection (37%) were the most frequency reported infections. Sedatives and analgesic medications are routinely used in mechanically ventilated patients to reduce pain and anexiety to allow patient to tolerate invasive procedures in ICU. ***(Hugonnets et al., 2007)***

Mostly a combination of opium to provide analgesia and hypnotic to provide sedation is commonly used. A variety of these drugs used by intravenous route (IV) in adults are available for use in ICU including (Morphine, Fentanil, Midazolam, and Propofol). ***(Vincent et al., 2006)***

Recently, several studies reported that longer duration of use of mechanical ventilation and longer hospital stay in patients who receive sedation in ICU are well known risk factors for ICU acquired infections. ***(Nseirs et al., 2005)***

Clinical studies comparing different sedative agents don't provide evidence to recommend uses of a particular agent to reduce ICU acquired infection rate . ***(Burke, 2003)***

However sedation strategies aiming to reduce the duration of mechanical ventilation, such as daily interruption of sedatives or nursing implementing sedation protocol should be promoted. ***(Malacame et al., 2008)***

In addition the use of short acting opoiods and sedatives as propofol and Dexmedetomidine, associated with shorter duration of mechanical ventilation and ICU stay might be helpful in reducing ICU acquired infection rate.

(Malacame et al., 2008)

Prolongation of exposure to risk factors for infection as (Micro aspiration, Microcirculatory effects, Immunomodulatory effects and Gastrointestinal motility disturbances) are main mechanisms by which sedation may favor infection in critically ill patients. ***(Hugonnets et al., 2007)***

Aim of the Work

The aim of this essay is to discuss data that suggests a relationship between infection and sedation to review available data for the potential causes and pathophysiology of this relationship and to identify potential preventive measures.

Chapter (1):

Risk Factors for ICU Acquired Infection

Several studies demonstrated that sedation prolongs exposure to risk factors for intensive care unit (ICU) acquired infection. In a prospective observational cohort study performed on 252 consecutive ICU patients requiring mechanical ventilation, Kollef and colleagues found that, duration of mechanical ventilation was significantly longer for patients receiving continuous intravenous sedation compared with patients not receiving it. ***(Kollef et al., 1998)***

Similarly, the lengths of intensive care and hospitalization were statistically longer among patients receiving continuous intravenous sedation. Furthermore, muscle relaxants are adjuncts to sedation in some patients. The use of muscle relaxant agents is a well-known risk factor for polyneuropathy and prolonged mechanical ventilation duration. ***(Arroliga et al., 2005)***

In the following lines we will discuss risk factors for ICU acquired infection in details:

1- Antimicrobial resistance in the intensive care unit and antibiotic use:

Bacteraemia is a frequent occurrence in the critically ill patients, with an incidence reaching 26% in intensive care unit (ICU) populations. Patients with community-acquired bacteraemia may require ICU admission for management of related organ dysfunction; however, the majority develops bacteraemia as a secondary nosocomial event, either on the general ward or while in the ICU. This is frequently related to extensive use of invasive procedures and an impaired immune response related to underlying disease processes or the unintentional effects of therapy. The clinical spectrum of bacteraemia can vary from asymptomatic through to septic shock. The source often remains unknown (primary), or is linked to local infection such as line-related sepsis or pneumonia. ***(Corona et al., 2004)***

The intensive care unit (ICU) often is called the epicenter of infections, due to its extremely vulnerable population (reduced host defenses deregulating the immune responses) and increased risk of becoming infected through-multiple