

Analysis and management of medical and organizational risks related to venous central catheterization in intensive care units.

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Analysis and management of medical and organizational risks related to venous central catheterization in intensive care units.

- ⇒ **Context & Objectives**
- ⇒ **Central Venous Catheterization**
- ⇒ **Methodology**
 - **Formalization of protocols**
 - **Data collection and analysis**
 - **Analysis of the incidents**
- ⇒ **Conclusion**

⇒ Context & Objectives

Central Venous Catheterization

Methodology

Conclusion

Generally, studies on ICU risk factors are focused on the purely medical factors (which are related to the patient, to the medical devices)

⇒ But risk analyses are seldom systemic

⇒ They do not consider factors related to management decision, organisational processes, workload, knowledge, etc.



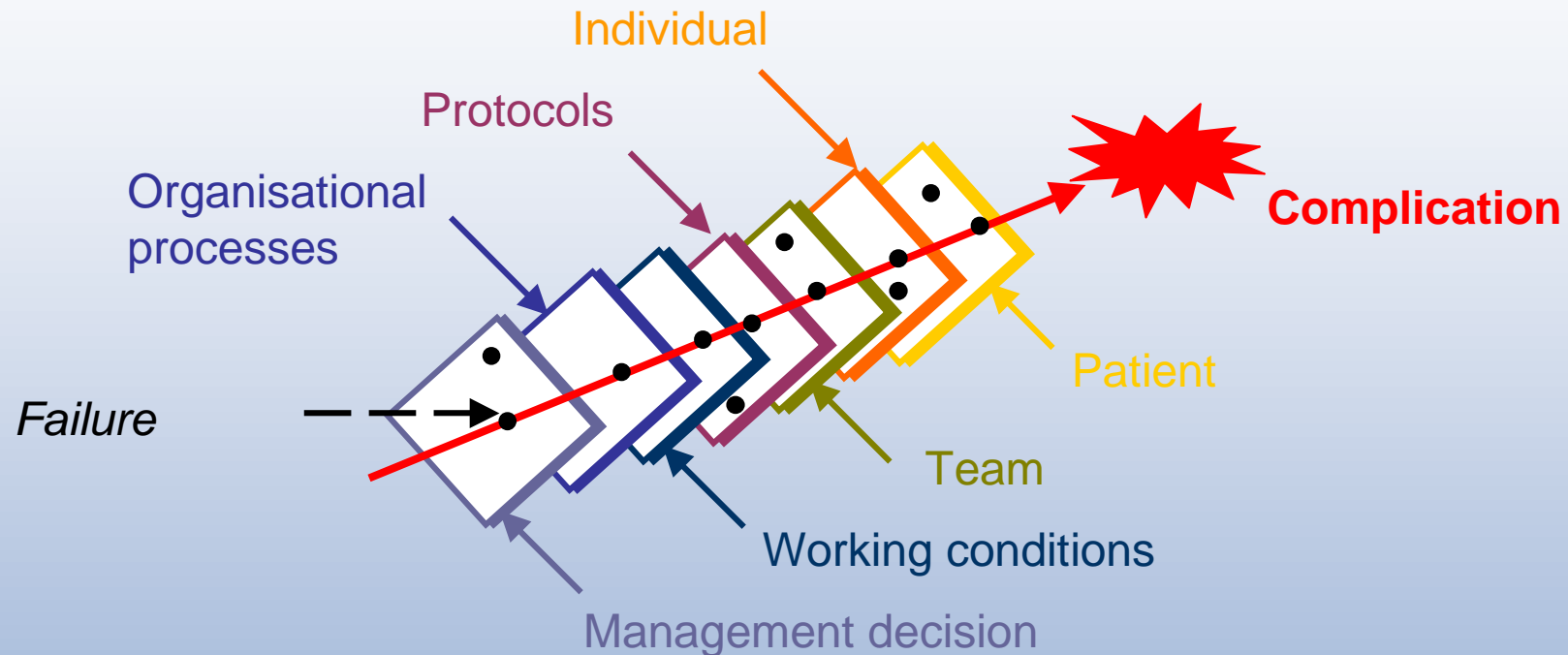
However, models suggested by researcher as J. Reason can be perfectly applied to the hospital (C. Vincent in the 90's).

⇒ Context & Objectives

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Systemic analyse of an incident (according to C. VINCENT)

Vincent Ch., Adam S., Stanhope N., *A framework for analysing risk and safety in clinical medicine*, BMJ, 1998, n°316, p. 1154-1157.

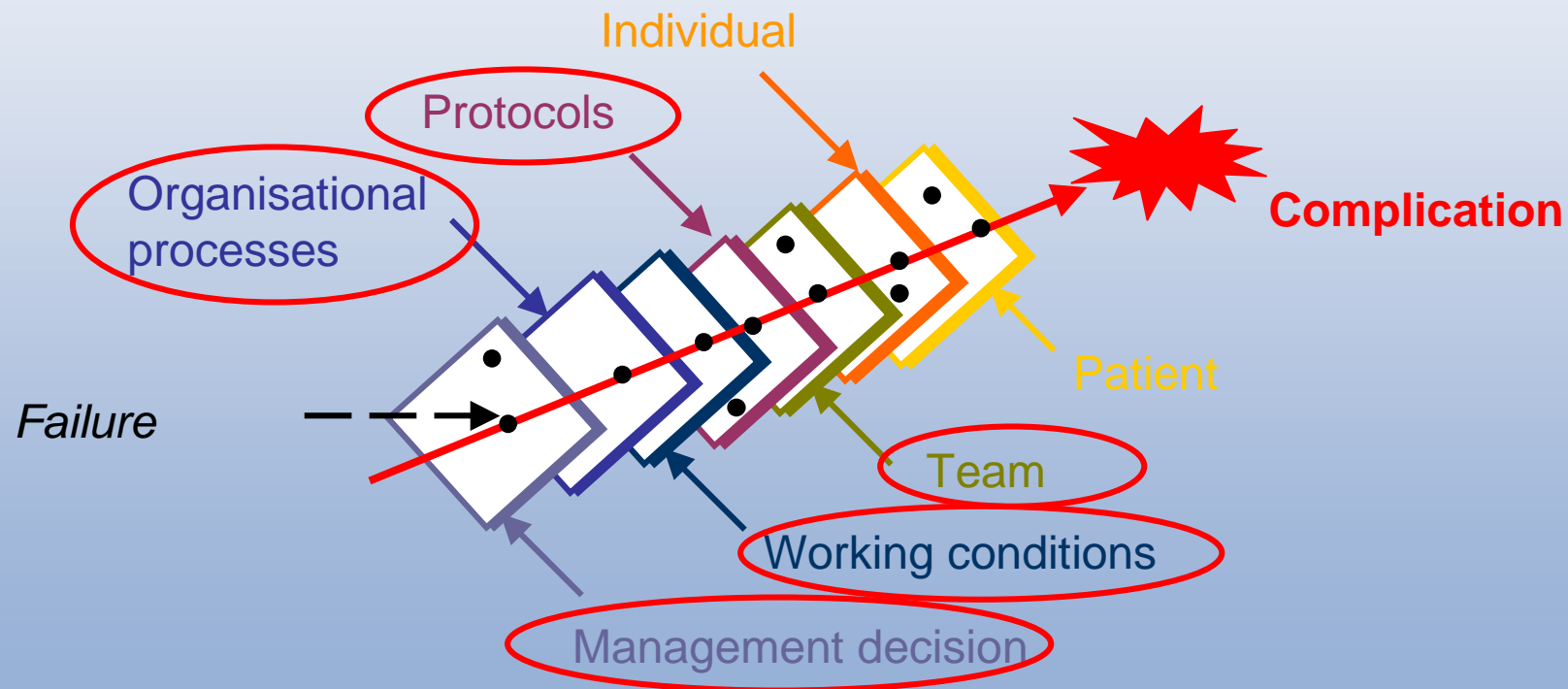
⇒ Context & Objectives

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We combine both kinds of research : medical, more traditional, but also sociological. It's allowing us to consider the organisational and human factors among the risk factors applied to medical complications.



⇒ Context & Objectives

Central Venous Catheterization

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Subject:

- To identify precursory factors of complications related to central venous catheter

Risk factors:

- Medical risks but also risks related to the organization and patient management

Intention:

- To define safer protocols and organizational modes

Context & Objectives

⇒ **Central Venous Catheterization**

Methodology

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What is Central Venous Catheterization?

1 - Indications for Use

2 - Types of Central Venous Access Devices

3 - Insertion site

4 - Complications

Context & Objectives

⇒ Central Venous Catheterization

▣ Indication for use

- ▣ Type of central venous access devices
- ▣ Insertion site
- ▣ Complications

Methodology

Conclusion

Indications for Use

- Rapid fluid administration – for example, in cases of multiple trauma, burns, extensive abdominal surgery or sepsis
- Administration of IV fluids requiring dilution within the central circulation to avoid vascular damage (chemotherapy, total parenteral nutrition)
- Administration of vasoactive and/or incompatible drugs
- Frequent blood sampling (in patients without an arterial line) and/or blood administration therapies

Context & Objectives

⇒ Central Venous Catheterization

▣ Indication for use

- ▣ Type of central venous access devices
- ▣ Insertion site
- ▣ Complications

Methodology

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Indications for Use

- Chronically ill patients in whom peripheral IV access is limited
- Central venous pressure monitoring for assessment of intravascular fluid status
- Measurement of oxygen saturation levels in blood returning to the heart
- Monitoring and access for either pre- or post- pulmonary artery catheter insertion (same insertion site)

Context & Objectives

⇒ Central Venous Catheterization

- ▣ Indication for use
- ▣ **Type of central venous access devices**
- ▣ Insertion site
- ▣ Complications

Methodology

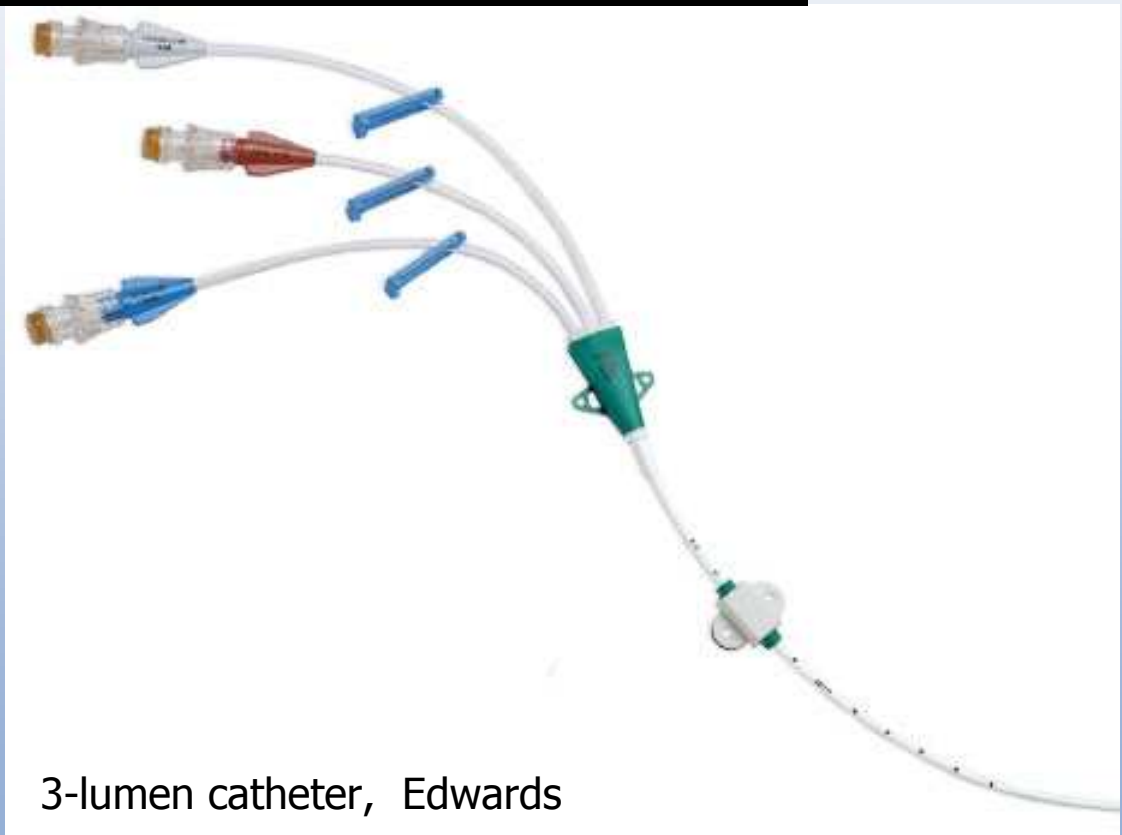
Conclusion

Types of Central Venous Access Devices

Single-lumen

or

Multi-lumen catheters



3-lumen catheter, Edwards

Context & Objectives

⇒ Central Venous Catheterization

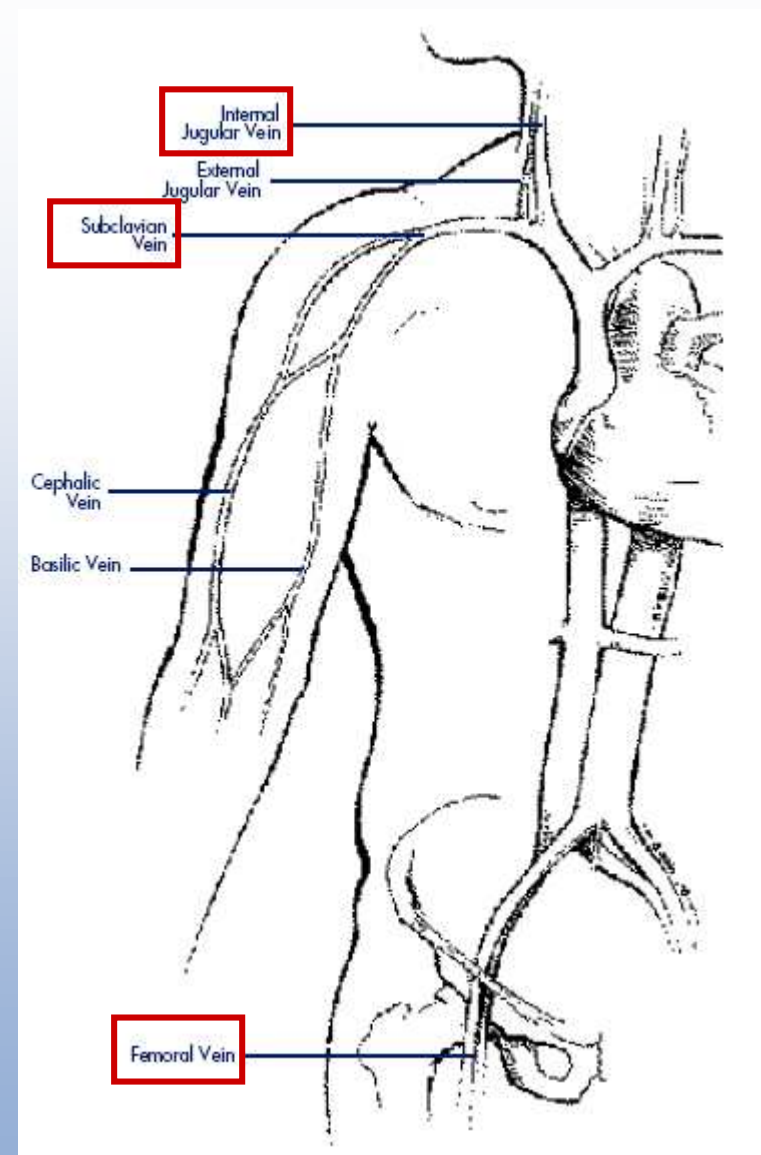
- ▣ Indication for use
- ▣ Type of central venous access devices
- ▣ **Insertion site**
- ▣ Complications

Methodology

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→ 3 insertion sites

- Internal Jugular Vein
- Subclavian Vein
- Femoral Vein



Context & Objectives

⇒ Central Venous Catheterization

- ▣ Indication for use
- ▣ Type of central venous access devices
- ▣ Insertion site
- ▣ **Complications**

Methodology

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Complications of central venous catheterization

- ✓ Insertion complication:
 - Mechanical complications
(arterial puncture, Pneumothorax, cardiac tamponade, malpositioned catheter, etc...)
- ✓ Delayed complication:
 - Thrombosis
 - Infection

Context & Objectives

Central Venous Catheterization

⇒ **Methodology**

Conclusion

Two Intensive Care Units

➤ Surgical Critical Care Unit of the European Hospital Georges Pompidou, Paris

16 beds

283 patients in 2005

4200 catheter-days

➤ Critical Care Unit of University Hospital of Saint Etienne

10 beds

233 patients in 2005

2500 catheter-days

Context & Objectives

Central Venous Catheterization

⇒ **Methodology**

Conclusion

Methodology in 3 stages

- ✓ Formalization of medical protocols, patient management and organisational processes
- ✓ Collection of the medical data related to the use of central venous access devices during one year, until the end of 2006
- ✓ Multivariate data analysis and sociological analysis of incidents

Context & Objectives

Central Venous Catheterization

⇒ Methodology

- ▣ Formalization of protocols

- ▣ Data collection and analysis

- ▣ Analysis of the incidents

Conclusion

Formalization of protocols

- Analysis of reference frames published by the learned societies
 - ↳ **Formalization of reference's protocols**
- Analysis of protocols related to central venous access follow-up in use in both units
 - ↳ **Formalization of theoretical protocols**
- Observations and interviews in both units
 - ↳ **Formalization of real processes**

Context & Objectives

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⇒ Methodology

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Formalization of protocols

- ✓ To describe the organization and patient management
- ✓ To compare the patterns between our two intensive care units
- ✓ To measure deviations from the norm

Example :

Insertion protocol for the physician

Context & Objectives

Central Venous Catheterization

⇒ Methodology

- ▣ Formalization of protocols
- ▣ **Data collection and analysis**
- ▣ Analysis of the incidents

Conclusion

Medical phase

⇒ Physicians and nurses indicate daily all acts and decisions related to central venous access devices, in each intensive care unit.

Data processing

Context & Objectives

Central Venous Catheterization

⇒ **Methodology**

- ▣ Formalization of protocols

- ▣ **Data collection and analysis**

- ▣ Analysis of the incidents

Conclusion

Medical phase

⇒ All these data will be analysed at the end of the collection in order to extract some precursory and protective factors of complications related to central venous access.

Context & Objectives

Central Venous Catheterization

⇒ **Methodology**

- ▣ Formalization of protocols
- ▣ Data collection and analysis
- ▣ **Analysis of the incidents**

Conclusion

Analysis of the incidents [1]

✓ Development of a history of the follow-up of the catheter to reenact the sequence of events, and to possibly identify precursory elements, in case of complication

↳ First database for the a posteriori analysis

Context & Objectives

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⇒ Methodology

- ▣ Formalization of protocols
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- ▣ **Analysis of the incidents**

Conclusion

Analysis of the incidents [2]

✓ To interview all the agents (physicians and nurses) having followed patients among whom complications occurred during the insertion or the follow-up of a central venous catheter

↳ Composition of the medical team, unit's workload, to compare the various points of view of the agents, etc.

↳ Debriefing

Context & Objectives

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⇒ **Conclusion**

Conclusion

- ⇒ To do systemic analysis of complications related to central venous access
- ⇒ To consider human and organisational factors as well as medical factors to improve safety for patients
- ⇒ To promote experience feedback within medical team in order to develop safety culture



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Thank you for your attention...

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