Chapter 4
Making a Case for Information Integrity in Healthcare

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ABSTRACT
This chapter presents a medical error example, which revolves around the issue regarding the nature of knowledge factors required in healthcare problem solving. Given the open system view of a healthcare system, the error presented here is of not correctly originating important, but less obvious, information requirements of the case. This leads to the loss of Information Origination Integrity, resulting in delivery of unsafe healthcare.

1. A REAL LIFE EXAMPLE: ANESTHETIC ERROR RESULTING IN LOSS OF HEALTHCARE GOAL INTEGRITY

When patients get treated for their ailments, they reasonably expect that their health condition will improve, or, at the least not deteriorate. This is a requirement of goal integrity (Nayar, 2002), between supplier (i.e., healthcare systems and components), process (i.e., treatment) and customer (i.e. patient). Medical literature examines a corpus of cases in anaesthesiology; one is as follows (Cook et al., 1991, 1994).

1.1. Case Description: A Vascular Surgery Inflicting Patient with a Myocardial Infarction

An elderly patient presented with a painful, pulseless, blue arm indicating a blood clot (embolus) in one of the major arteries that threatened loss of that limb. Emergency surgery to perform removal of the clot (embolectomy) was clearly indicated. The patient had a complex medical and surgical history with high blood pressure, diabetes, requiring regular insulin treatment, a prior heart attack, and previous coronary artery bypass surgery. The patient also had evidence of
recently worsening congestive heart failure, that
is, shortness of breath, dyspnea on exertion and
leg swelling (pedal edema). Electrocardiogram
changes included inverted T waves.

Chest X-ray suggested pulmonary edema. The
arterial blood gas showed markedly low oxygen
in the arterial blood (paO2 of 56 on unknown
FiO2). The blood glucose was high (800). The
patient received furosemide (a diuretic) and 12
units of insulin in the emergency room. The pa-
tient was taken to the operating room for removal
of the clot under local anesthesia with sedation
provided by the anesthetist. In the operating room
the patient’s blood pressure was high, 210/120; a
nitroglycerin drip was started and increased in an
effort to reduce the blood pressure.

The arterial oxygen saturation (SaO2) was
88% on nasal cannula and did not improve with
a rebreathing mask, but rose to the high 90s
when the anesthesia machine circuit was used to
supply 100% oxygen by mask. The patient did
not complain of chest pain but did complain of
abdominal pain and received morphine. Urine
output was high in the operating room. The blood
pressure continued about 200/100. Nifedipine was
given sublingually and the pressure fell over 10
minutes to 90 systolic. The nitroglycerin infusion
rate was decreased and the pressure rose to 140.
The embolectomy was successful. Post-operative
cardiac enzyme studies showed a peak about 12
hours after the surgical procedure, indicating that
the patient had suffered a myocardial infarction
(heart attack) sometime in the period including
the time in the emergency room and the operating
room. The patient survived.

2. LOSS OF INFORMATION
INTEGRITY

What went wrong? Was it the error in medical
prescription first by the physicians who saw the
patient initially, and then by the anesthetist or
error in surgical procedure or in procedures pursued
by the anesthetist? Or was the error due to lack
of skill on the part of participants? All these are
post-event observations. In the peer review that
followed after the incident it was apparent that
many of the practitioner’s actions were appropri-
ate in the context of the case as it evolved. For
example, the level of oxygen in the blood was low
and the anesthetist pursued several different means
of increasing the blood oxygen level, including
the use of oxygen by mask.

What really went wrong is all through the
course of the vascular surgical treatment the prac-
titioner assumed patient’s intravascular volume as
“high” as already validated for patients with high
signs of congestive heart failure and the informa-
tion processing operative in the context was not
gear to anticipate information error, i.e., loss of
Information Integrity (I*I) (Mandke et al., 2002).

3. INFORMATION ORIGINATION
ERRORS AND LOSS OF
INFORMATION INTEGRITY

Error here is of not originating correctly less
obvious but more important, information require-
ments of the case (Bogner et al., 1994; Cook et

3.1. Resulting in Loss of
Healthcare Information Content
Integrity and Healthcare Goal
Integrity at Physician Level

High increased intravascular volume is often
present in patients with signs of congestive heart
failure. In this case, condition of congestive heart
failure was present with other (system environ-
mental) factors including those of high blood
sugar and the prior treatment with a diuretic.
This indicated that the patient’s intravascular
volume is “low.” The fact that the blood pressure
fell much further than intended was probably the
result of depleted intravascular volume, which