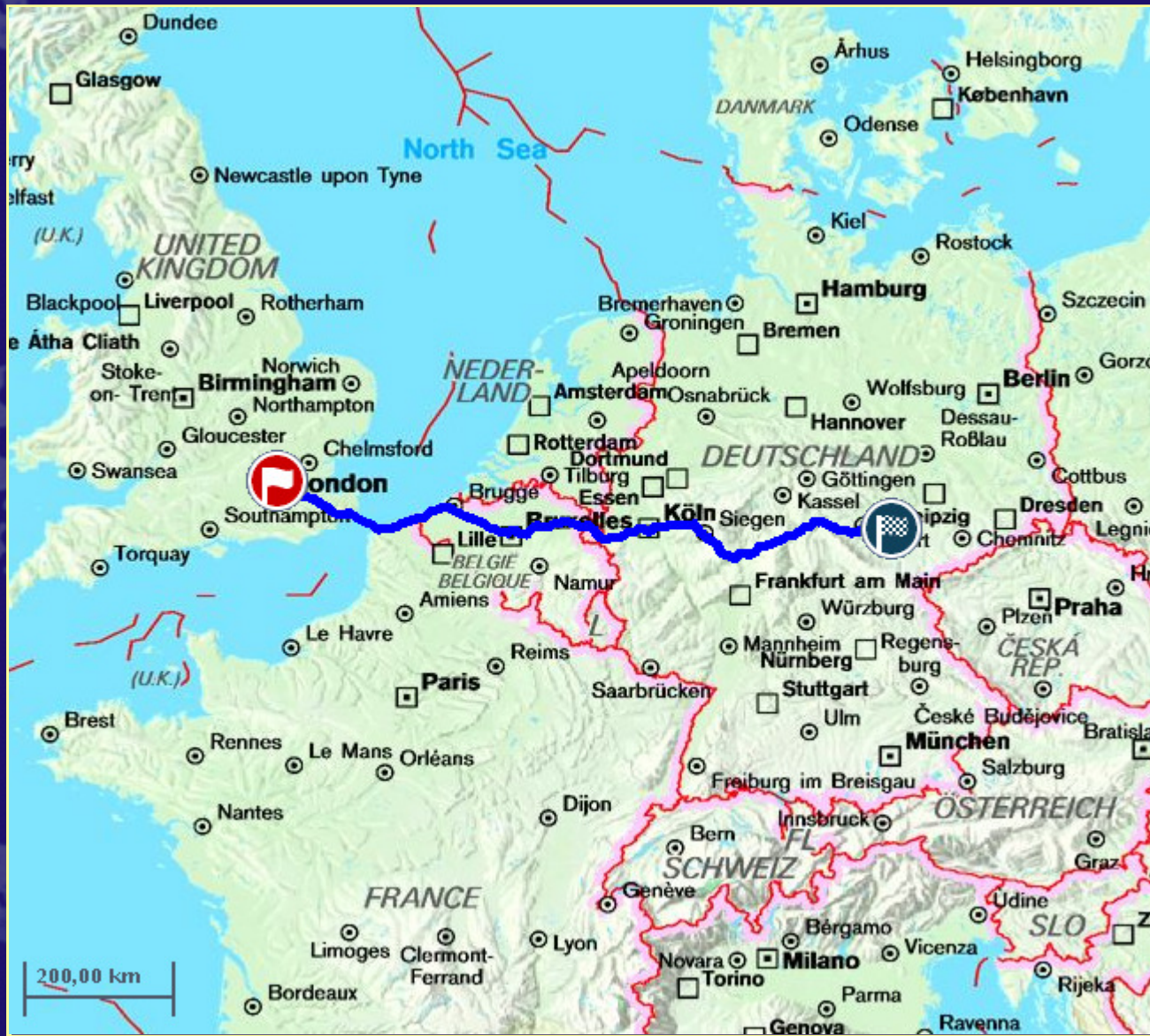# Implementation of RFID

PD Dr. M. Hartmann, MPH, MBA
**University of Jena**
Hospital Pharmacy

"Ladies and gentlemen, welcome aboard Flight Number 743, bound for Jena. This is your captain speaking. My name is Michael Hartmann. Our flight time will be 30 minutes, and I am pleased to report both that you have a 97% chance of reaching your destination without being significantly injured during the flight and that our chances of making a serious error during the flight, whether you are injured or not, is only 6.7%. Please fasten your seatbelts, and enjoy the flight. The weather Jena is sunny."

Berwick DM, Leape LL, BMJ, 1999

Medical Errors by Type
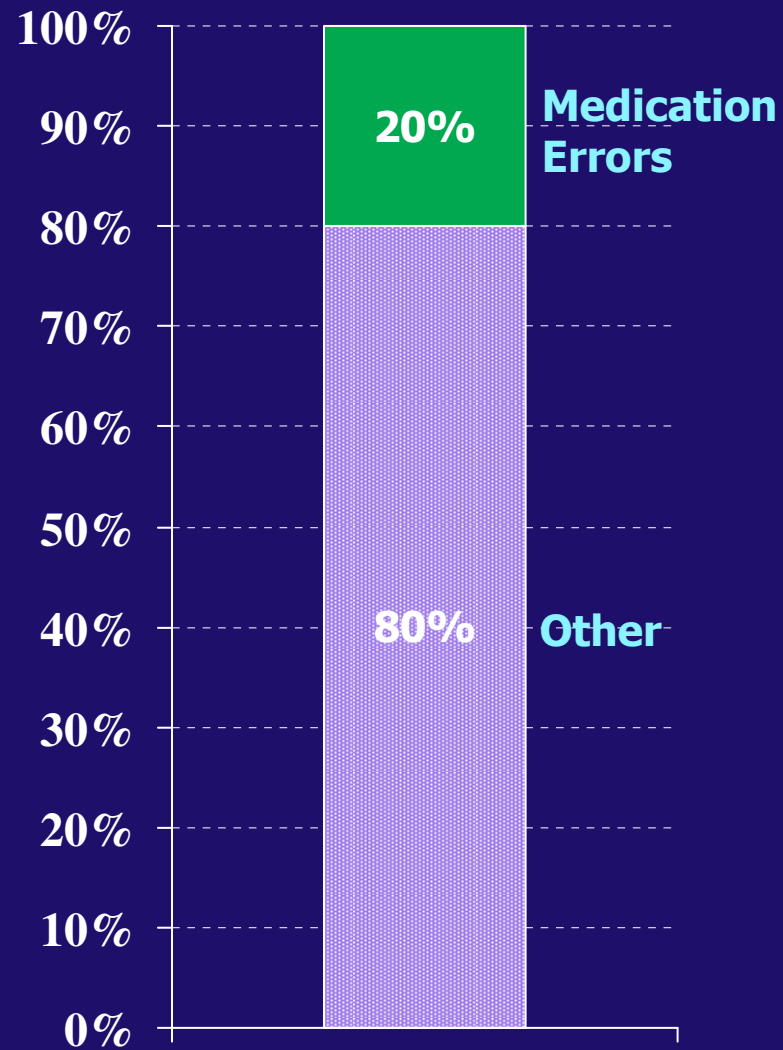
Leape, et al

Definition: medication error

- **Every mistake, which occurs during prescription, distribution, preparation or dispensing of drugs – independent of the fact that the patient is harmed or not.**
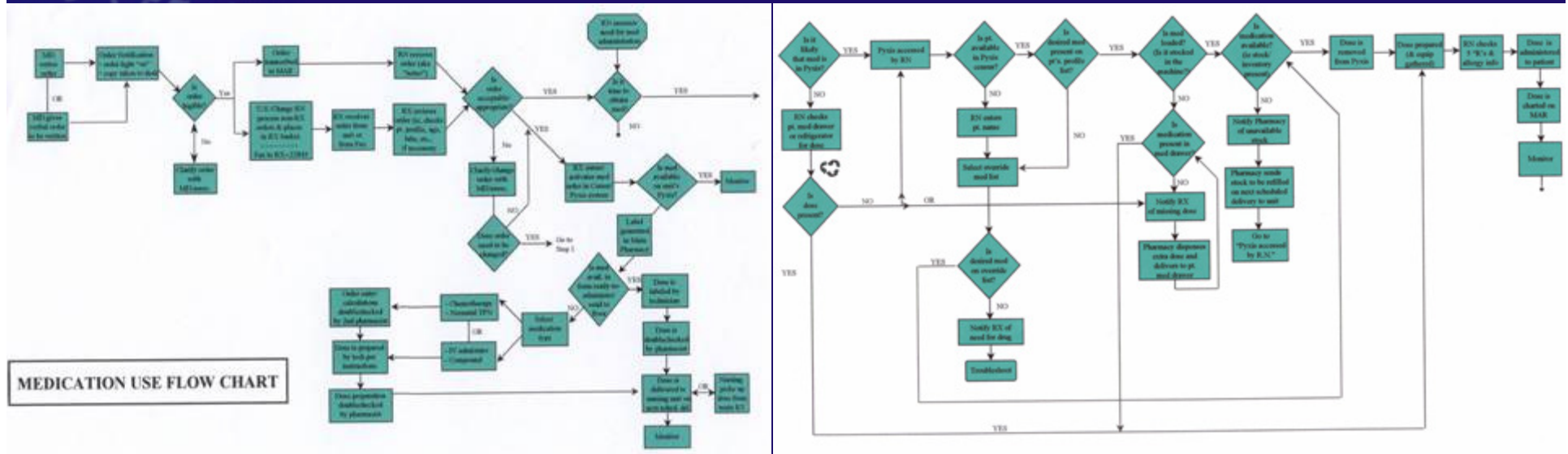
Van den Bemt et al, Drug safety 2000
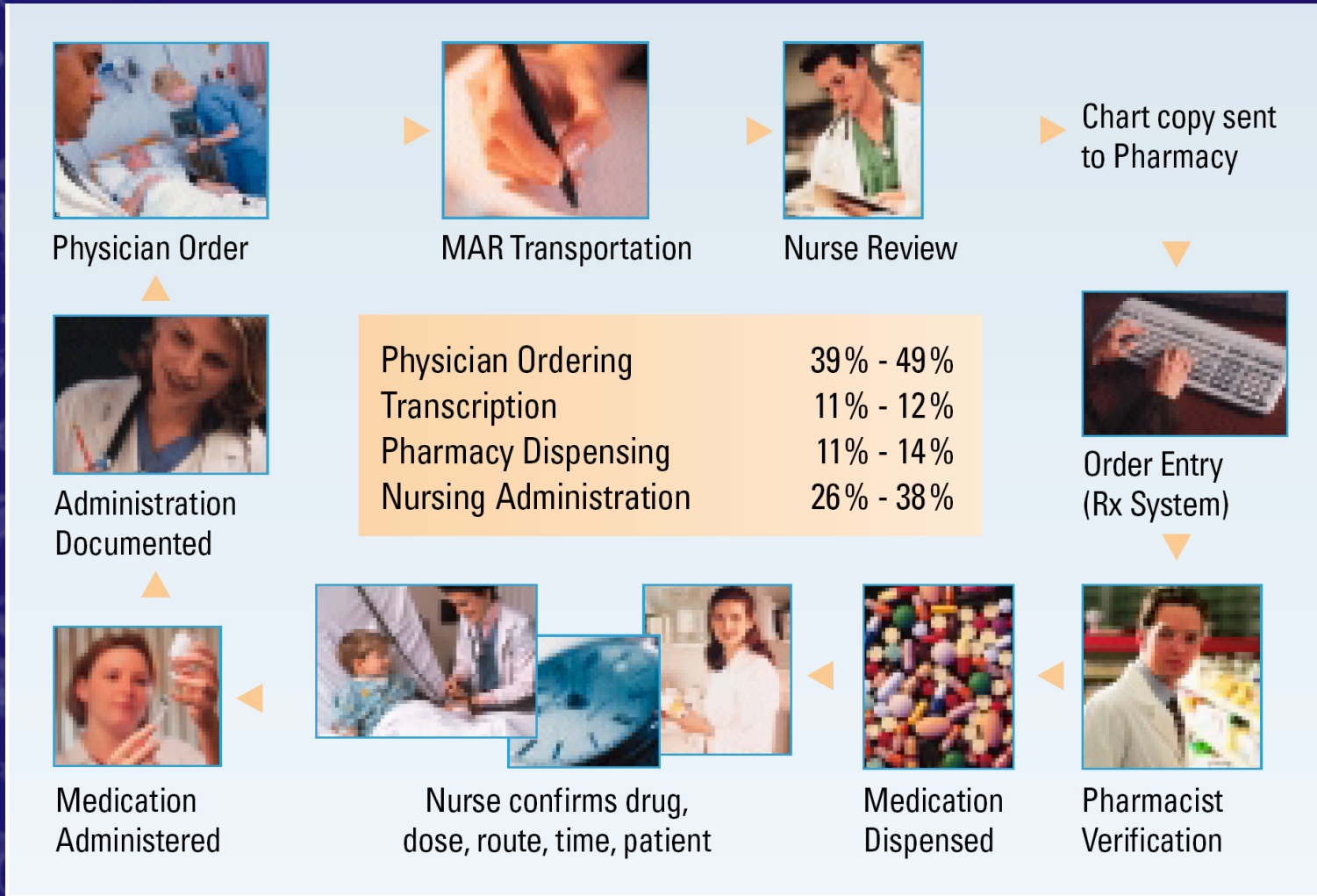
"MAKING SURE THE CURE ISN'T WORSE THAN THE DISEASE"

Sheldon S. Sones, Newington, CT

The `typical` hospital medication-use system…

MEDICATION USE FLOW CHART

…has, at minimum, 80 <u>distinct</u> steps

Where do medication errors occur?

Physician Order

MAR Transportation

Nurse Review

Chart copy sent to Pharmacy

Administration Documented

Physician Ordering	39% - 49%
Transcription	11% - 12%
Pharmacy Dispensing	11% - 14%
Nursing Administration	26% - 38%

Order Entry (Rx System)

Medication Administered

Nurse confirms drug, dose, route, time, patient

Medication Dispensed

Pharmacist Verification

D. Rucker, F. Eisenberg, K. Stewart, electromedica 69 (2001) Heft 1
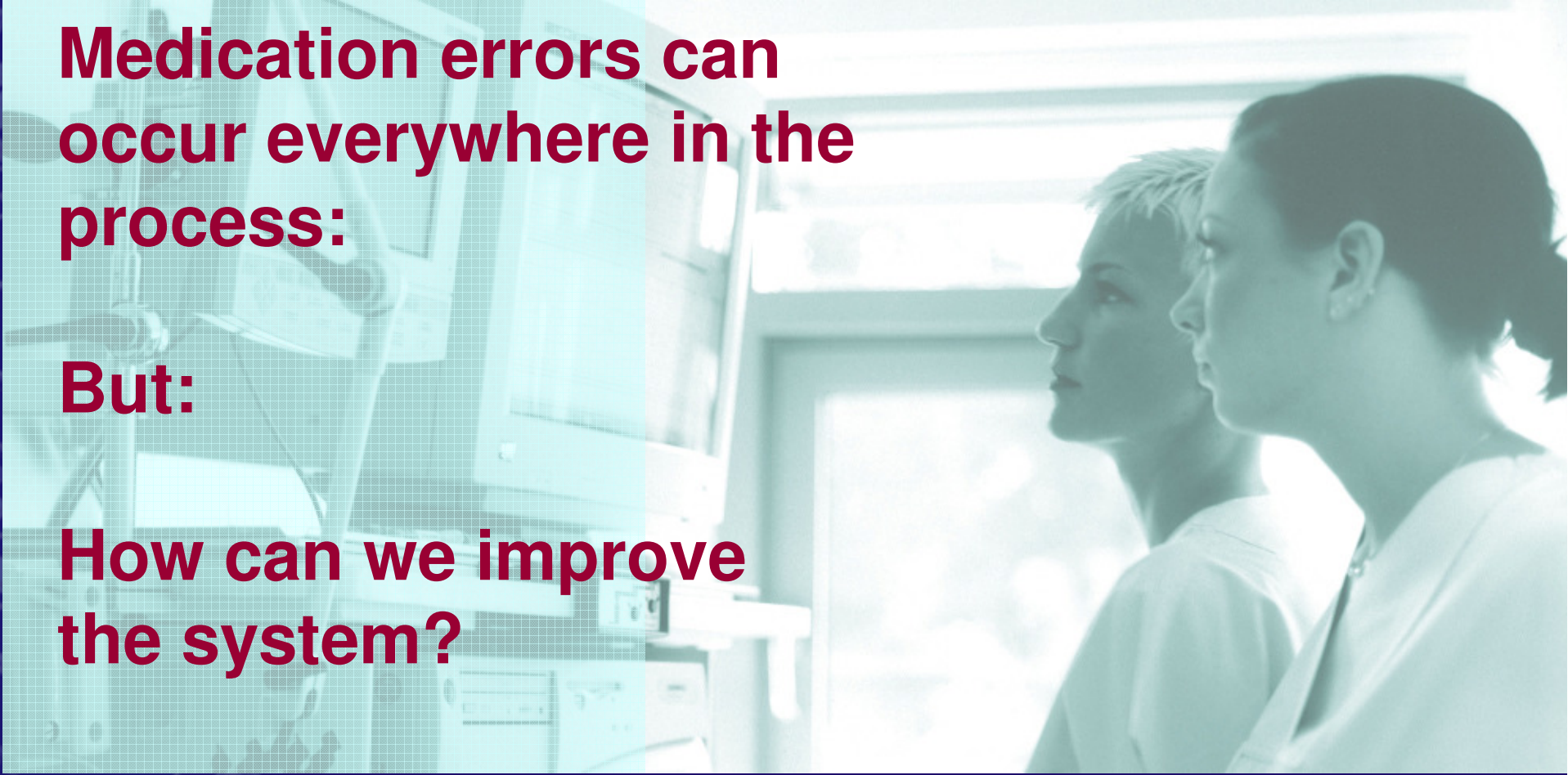
Drug prescription

Picking

Transport

Intake and documentation
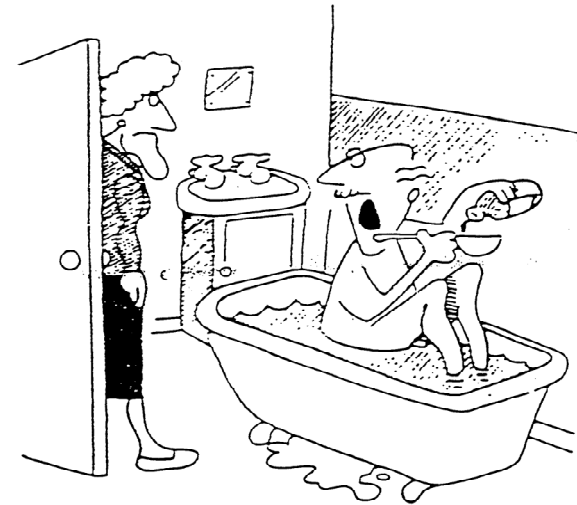
The doctor told me to take this in water.

Medication errors can occur everywhere in the process:

But:

How can we improve the system?

Best practices

- **Computerised Physician Order Entry (CPOE)**

- **Pharmacists review of prescriptions**

- **Drug packed individually for each patient (unit-doses)**

- **Special Attention for drugs with high risk**

- **Point of care verification**

- **Selection of drugs used in a hospital with respect to medication safety**

- **Usage of patient-owned drugs in hospital**

Best Practice: Pharmacists review of prescriptions

Best Practice: Pharmacists review of prescriptions

Clinical result
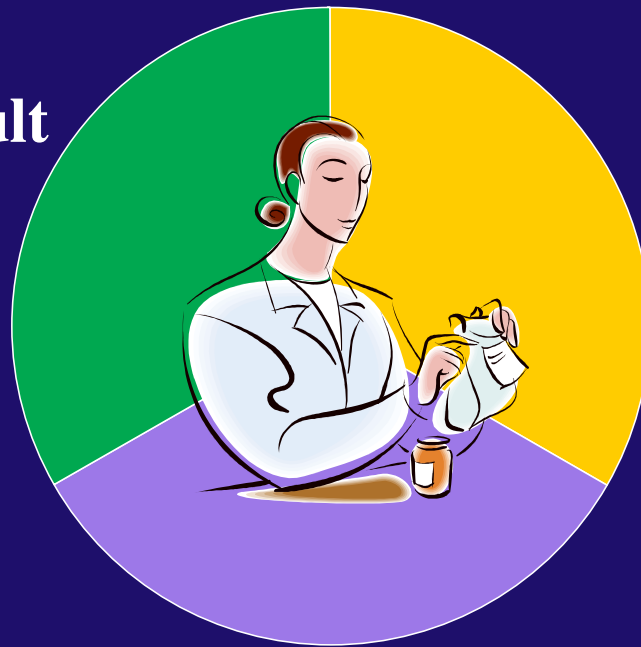
Oeconomic result

CLINICAL COMMENTARY

Michael Hartmann
Andreas Meier-Hellmann

How to increase return on investment of the intensive care pharmacist – fear of flying

$$ROI\ \% = \frac{Cost\ Savings \quad - \quad Costs}{Costs} \times 100$$

	Intervention on the rounds	Intervention by computer (e-mail)
Accepted	104 (75.9%)	293 (75.5%)
Not accepted	33 (24.1%)	95 (24.5%)
Total	137 (100%)	388 (100%)

	Intervention on the rounds ($n = 137$)	Intervention by computer (e-mail) ($n = 388$)
Savings per intervention	12.93	8.52
Costs per intervention	4.65	2.79
Profit per intervention	8.28	5.73
ROI (%)	178.1	205.4

Hartmann u. Meier-Hellmann, 2006

Special attention towards drugs with high risk

Medication errors linked to administration in an intensive care unit

2009 medication administration interventions by nurses

Error types	Fatal	Life-threatening	Significant	Minor
Preparation (n=24)	0	10	9	5
Dose (n=41)	0	5	12	24
Administration technique (n=10)	0	1	2	7
Physiochemical incompatibility (n=19)	0	5	12	2
Rate of administration (n=29)	0	4	15	10
Time of administration (n=9)	0	1	5	3
Total	0	26	55	51

Tissot E, et al.,
Intensive Care Med, 1999

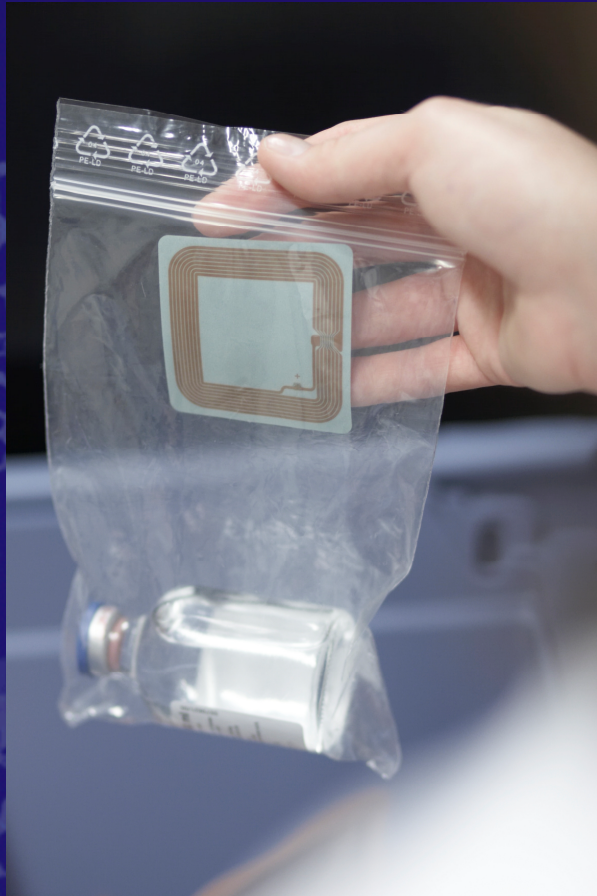# Drug packed individually for each patient (unit-doses)

Taxis K, Dean B, Barber N. Pharm World Sci 1999

"A hospital using the **traditional German System,** errors occur in **5.1 %**"

„With a **Unit-Dose-System** the rate of errors is **2.4 %**"

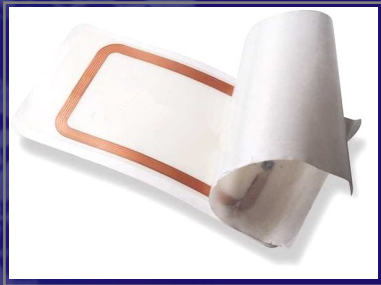**Challenge:**

RFID technology to eliminate even this rate

Picking

RFID in short

RFID: **R**adio **F**requency **ID**entification

– Technology for identification and location of single items and patients with radio waves

● **RFID-Tags:**

– consist of a chip and an antenna (+ battery)

– is active and/or passive

– Readable and writable
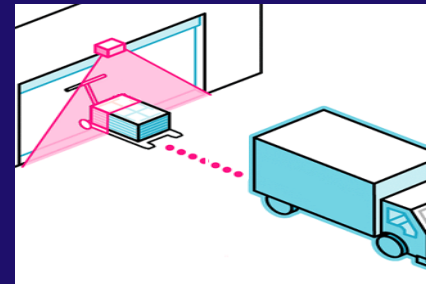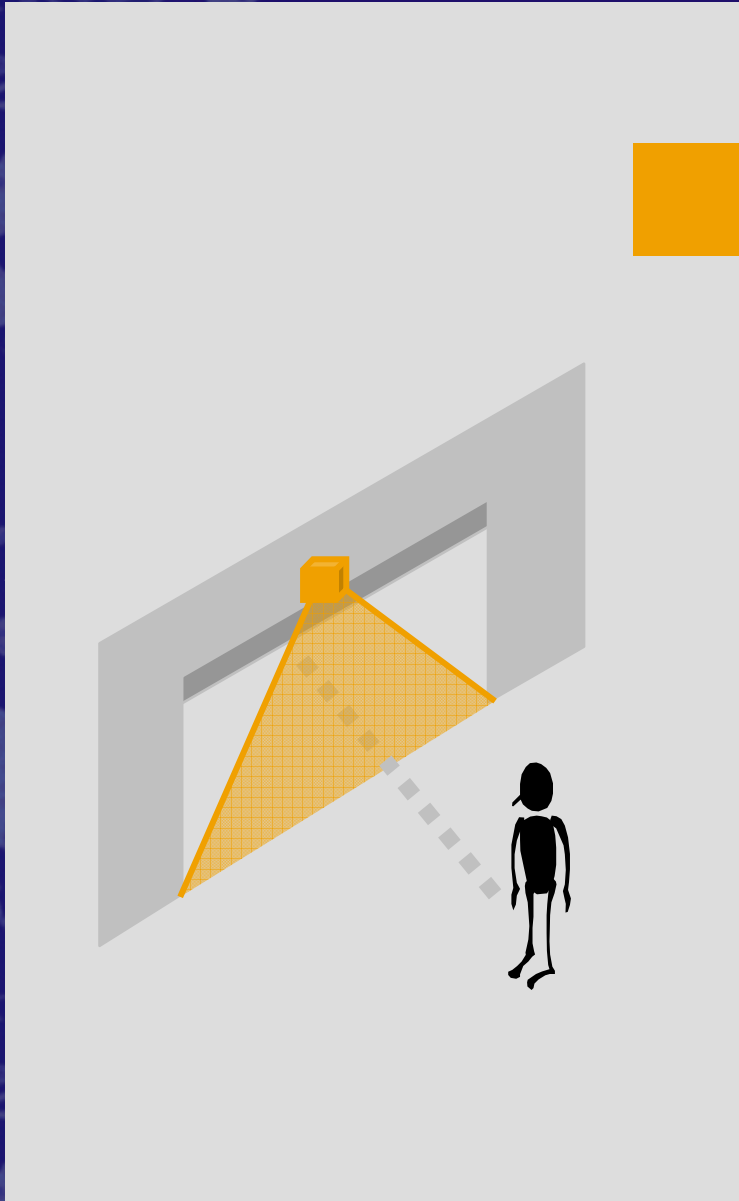
– Consists of a Smart Label, Smart Item, Transponder

● **AutoID:**

– Automatic Identification

RFID - Technology is connecting

– **Comfort**
- Scanning without line of sight
- Data can be changed

– **Efficiency**
- Multiple tags can be read at the same time (>> 100 per sec)
- lower error rate than with bar codes

– **Speed**
- Tags readable up to 80 km/h

– **Localisation**
- Localisation of devices and persons
- greater read distance

– **Data protection**
- Data can be encrypted
- Kill commando possible

Transport

Fixed Scanner

Pharmacy

Intensive ward

| Prescription Drug | Picking | Container | Leaving pharmacy | Entry Intensive ward | Optional: Entry room | Issued from drawer | Patient and drugs matching |

Intake and documentation

How can RFID help ?

- **Right drug dispensed**

- **Right – patient, drug, dose, route, and time**

- **Data collection for Quality Improvement**

- **Product recall (if…)**

- **Product expiration (if…)**

- **Inventory control and billing**

- **Nurse satisfaction**

RFID is increasing the quality of care

Drug Prescription	Picking	Transport	Intake and documentation
The doctor is prescribing the drug in the Clinical Physician Order Entry. The pharmacist supervises the prescribing doctor.	Digital communication to the pharmacy. The pharmacy is commissioning unit-dose labelled with RFID tags.	The whole transport of the drug is controlled by scanning and followed digitally.	It is checked by the RFID tag, if the right drug is at the right patient. Documentation in patient file is done automatically when dispensing.

For the first time there is a continous/digital/by software supported process

from the prescription of the drug to the intake by the patient

–

inclusive automatic documentation,

consultation and ordering

Medikamente verwechselt +++ Benjamin (5 Monate) stirbt nach OP +++ Schock und

Das Protokoll

Eine Sekunde entschied zwischen Leben und Tod

Best practice in medical care

- Software for electronic prescriptione

- Control of prescription by pharmacist

- Drug packed individual for each patient (unit-dose)

- Special Attention for drugs with high risk

- Verification at point of care

- Selection of drugs used in a hospital with respect to medication safety

- Usage of patient-owned drugs in the hospital

Selection of drugs used in a hospital with respect to security

Usage of patient-owned drugs in the hospital

safety
barriers

Adverse Event

https://www.cirsmedical.ch/start/default.htm
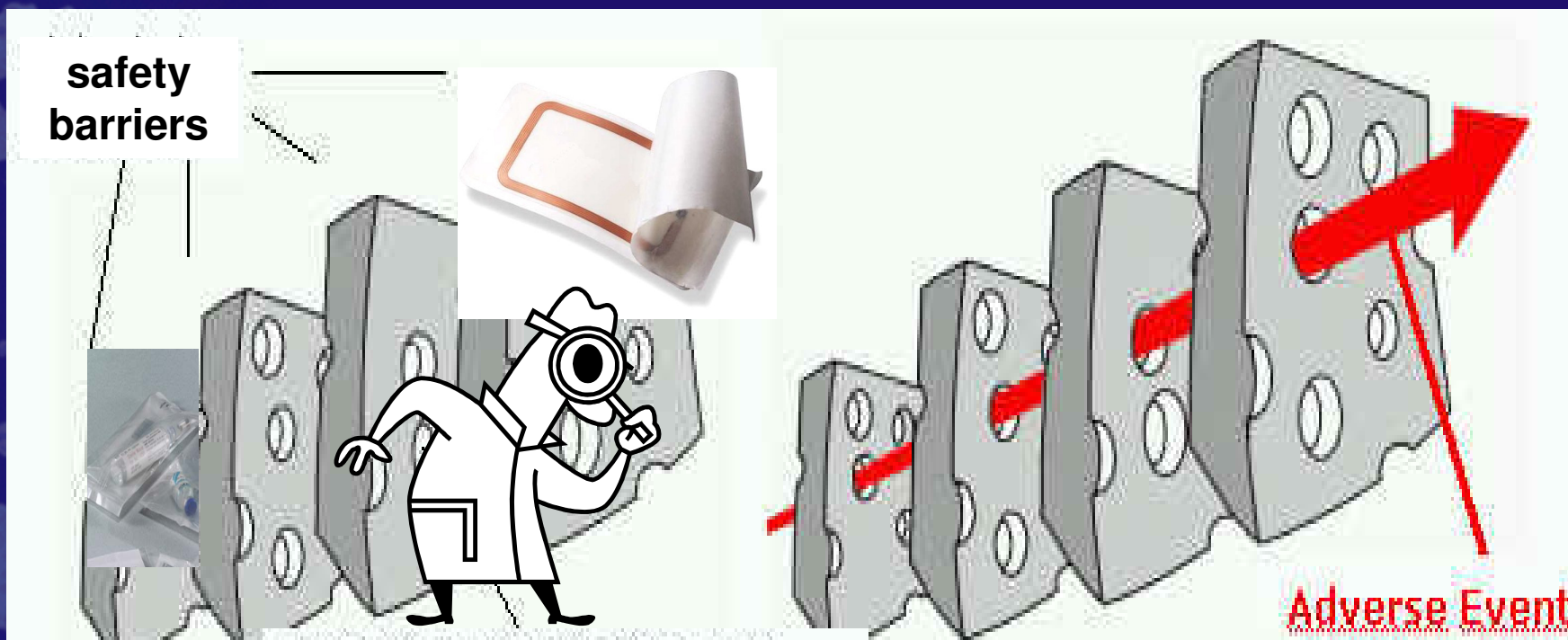
Lessons from a Leader

"Safety is not a priority, it's a way of life"

Paul O'Neill
CEO Alcoa Steel
Treasury Secretary

Safety culture means a change in paradigm

OLD

Who has caused the mistake?

Focus on mistake

Upside-down
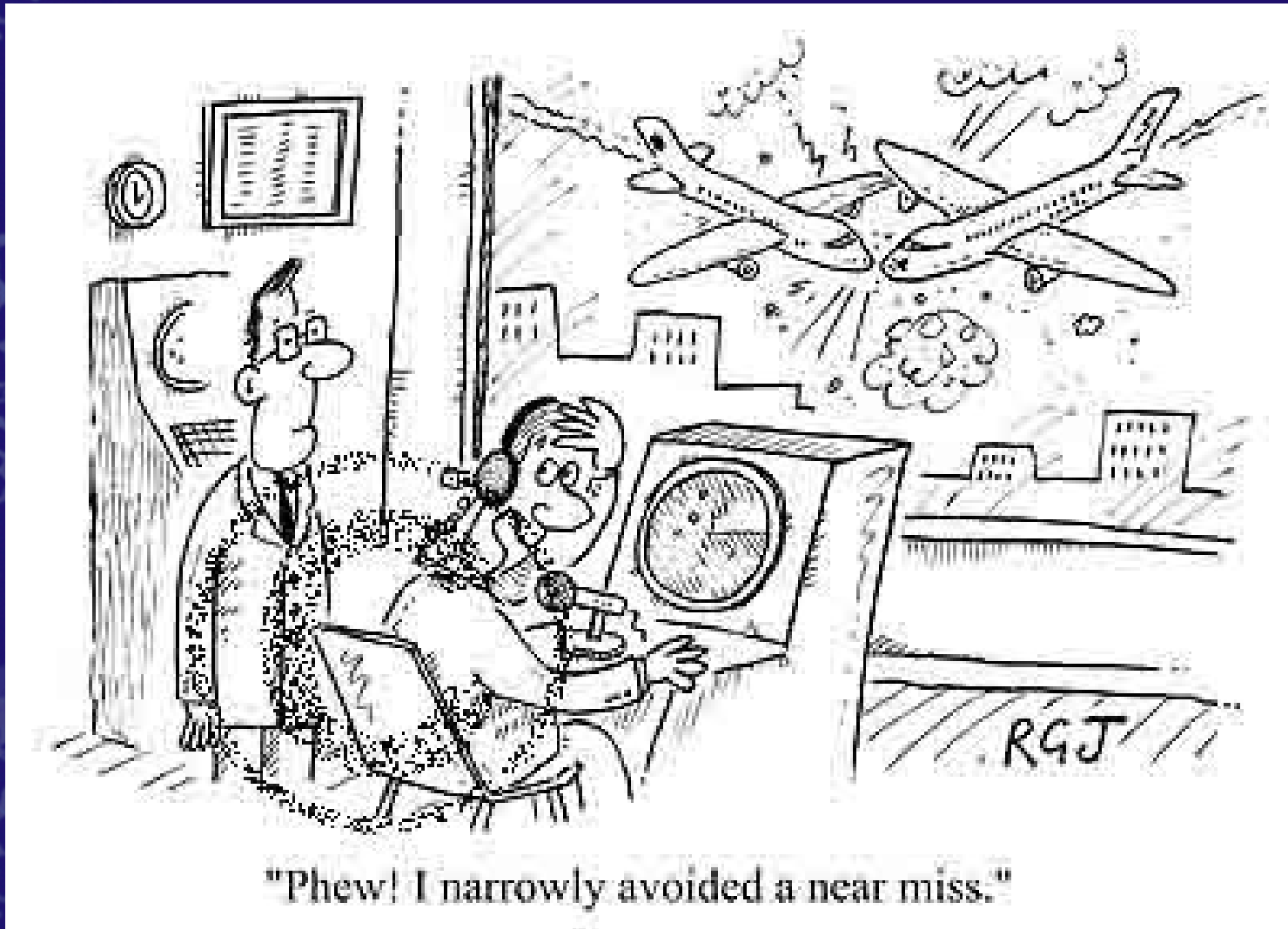
Punish the originator

NEW

What happened ?

Focus on near miss

Bottom-up

Improve the process

"Phew! I narrowly avoided a near miss."

The END and...

many thanks for your interest