Towards pervasive ICT solutions in the healthcare sector: an integrated technology approach to safer and efficient clinical processes in organizations

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Agenda

- Background and objectives
- Safe transfusions and total blood traceability
- The Tissue Bank Project
- Future Developments
Background and objectives

Founded in 1925 the Fondazione Istituto Nazionale dei Tumori is widely recognised as a top tier Scientific Research and Treatment Institution (IRCCS)

- 14,000 in-patients
- 12,000 day-hospital patients
- 900,000 out-patients
- >15,000 surgical treatments
- 362 acute care beds, 51 day hospital beds, 8 operating theatres
- ~ 1900 employees
### Background and objectives

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Area of intervention</th>
<th>Examples of applications</th>
<th>Target</th>
<th>Range of action</th>
</tr>
</thead>
</table>
| **Now**    | Intervention on support processes: near existing technologies | Patient identification  
EPR access  
Ward safety  
Access control | Enhancement in current activities, with low organizational impact | Narrow |
| **Tomorrow** | Intervention on single core processes ("stand alone" solution) | Error reduction  
(patient/drug/meals/etc)  
Blood bags tracking  
Internal logistics (e.g. drugs)  
Patient monitoring | Efficiency / Effectiveness / Safety of single process | BPR project on a single process |
| **Future** | Whole organization | Clinical process control and workflow management  
Extensive tracking in logistics  
Safety systems  
More effective management control | Overall efficiency and effectiveness | Extended BPR project covering the whole organization |

(Adapted from Eximia, 2005)

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**Current and future opportunities for RFID implementations in the Italian healthcare sector**
RFID fits an integrated IT strategy at the Italian National Cancer Institute:

- aiming at enabling the spread of applications to support pervasively clinical and research processes in the context of oncology care

- supporting an innovative use of technology focusing on the enabling role of IT on process governance instead of the diagnostic aspects of technology (machinery)
The first RFID experience has been a project on transfusion safety in 2005-7 with the aim to address two major pain points:

**Patient Safety**

**Auditing of transfusion process**
Safe Transfusions and total blood traceability

**Infection risk**

<table>
<thead>
<tr>
<th>Virus</th>
<th>Residual Risk</th>
<th>Expected cases out of $10^6$ donations</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>1:417.000</td>
<td>2,4</td>
</tr>
<tr>
<td>HBV</td>
<td>1:70.000</td>
<td>14,3</td>
</tr>
<tr>
<td>HCV</td>
<td>1:154.000</td>
<td>1,1</td>
</tr>
</tbody>
</table>

Residual risk related to blood transfusion (Lombardy Region)

**Adverse events**

transfusion adverse events
Statistics on 482 adverse events reported

SHOT - Serious Hazards of Transfusion
Safe Transfusions and total blood traceability

Better patient care

- Right patient
- Right therapy
- Right match patient-therapy
- Right method
- Right time
Safe Transfusions and total blood traceability

“to be” transfusion process

- **Transfusion Centre**
  - Sample reception
  - Sample analysis
  - Blood bag assignment
  - Blood bag delivery
  - Bag tagging and ID check
  - Visual check prior to delivery

- **Ward**
  - Ward admission
  - Blood sample collection
  - Sample delivery
  - Blood bag request
  - Blood bag reception
  - Unit storage preparation
  - Transfusion
  - Patient data check against the central information system registers. RFID wristband initialization by nurse

- **Transfusion Centre**
  - Requirement: admission list transmitted to PDA
  - Transfusion data download from PDA, update of synchronisation file for Transfusion Centre database alignment
  - Audio visual alert in case of mismatch

- **Ward**
  - Transfusion data download from PDA, update of synchronisation file for Transfusion Centre database alignment

Fondazione IRCCS “Istituto Nazionale dei Tumori”
Safe Transfusions and total blood traceability
Safe Transfusions and total blood traceability

Key Performance Indicators

**Benefits for the Transfusion Centre**
- Process Transparency
- Traceability
- Continuous process monitoring
- Informative feedback

**Benefits for the entire Institute**
- Service Quality
- Patient safety
- Error reduction (Insurance fee reduction)
Safe Transfusions and total blood traceability

Key Performance Indicators

- > 1,7 million euro/year blood bags supplied
- ~11% average value of blood bags returned/non transfused
- ~200 euro average cost of blood bag

System Usage Rate

98.4% on delivered blood bags

* Data referring to Sept-Oct-Nov 2006 trials
The Tissue Bank Project

The achieved experience is being exploited to another project about total traceability of the oncological tissue biobank over time and temperature sensitive surgical specimens with the focus on:

The exact identification of specimen

Quality control procedure for tissue processing and storing

Tracing the process and transport lead times

Developing a shared scientific data-base
The Tissue Bank Project

Surgeon and surgical team

- Surgery and tissue removal

- Specimen RFId tagging
- Digitalization of analysis request
- Specimen checklist (digital transport form)

Operating theatre staff

- Transport to Pathological labs

- RFId gates (operatory theatre, lab entrance)
- Automatic inventory
- Staff autentication via RFId badge

Anatomy/Pathologist

- Specimen processing (Pathological anatomy)

- RFId tagging of specimens for item tracing
- Digitalization and filling of slides
- Application integration for exchange of slides and medical reports

Technician of the Tissue Bank

- Signalling of Case studies

- Access to surgery schedule and patient data
- Automatic highlight of interesting cases

- Specimen processing (Tissue bank)

- Staff autentication via RFId badge
- Support to processing activities
- Digitalization and filling slides
- RFId specimen tagging for single-item tracing

- Sample storage and conservation (Tissue bank)

- Optimization of sample storage and retrieval
- Active support and inventory update

Sample provision

- Open research tools on clinical data
- RFId tagging of provided specimens for informative feedback on research projects

Reporting

- Advanced tools for data search
- Customizable reporting tools
Future developments

Pervasiveness in the value chain

1. Blood Transfusion Pilot
2. Inventory of surgical instruments
3. Extention to all INT units
4. Partnership with other hospitals

Approach to change

- Join Process
- Process Automation
- Process Reengineering

Value chain

- Single area/ward
- More wards
- Whole Organization
- Hospital consortium
- Whole Organization
Future developments

Extension of RFId technology to:

- blood units supply to other hospitals within the Region
- chemotherapy process
- management and tracking of surgical instruments

In our experience, under clear objectives and methodology, RFID has proved leading to sustainable and measurable results