International Workshop on:

Home telemonitoring, and its status in Cyprus, Greece, and Italy

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Telecare in Peritoneal Dialysis
Current Trends and Design Considerations

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peritoneal dialysis

- one of the basic treatments for patients with end stage renal disease (ESRD)
  - artificial kidney (haemodialysis)
  - peritoneal dialysis
  - renal transplant

- implemented at patients’ home and allows
  - continuity of personal and professional activities
  - mobility (vacation, travel, etc)
  - better & regular nutrition
  - better results in future renal transplant

E. Kaldoudi & V. Vargemezis
end stage renal disease frequency
expected ESRD frequency increase

431,000
treatment for ESRD

1. renal transplantation

2. dialysis: removal of water and body wastes that build up in failing kidneys

   artificial kidney
   ⇨ blood cleaning outside the human body via specialized equipment (artificial kidney)
   ⇨ performed in a hospital (rarely at home)
   ⇨ 4 hours X 3 times per week

peritoneal dialysis
   ⇨ blood cleaning based on fluid exchanges in the peritoneal cavity
   ⇨ performed at patient's home, throughout the day/night
peritoneal dialysis

- A dialysis fluid is inserted in the peritoneal cavity, after a period of time becomes saturated with waste and then it is exchanged with new fluid.
  - ~4 exchanges per day
    (or a number of exchanges during the night)
  - Requires a catheter in the peritoneal cavity & a special mobile unit for fluid exchange
  - Performed at patient’s home
  - ~1 scheduled hospital visit per month
peritoneal dialysis

CAPD - continuous ambulatory peritoneal dialysis

APD - automated peritoneal dialysis
peritoneal dialysis

- effectiveness of the method depends among else on the specific dialysis scheme, which depends on:
  - patient's weight changes
  - type and amount of fluid inserted and exerted
  - blood pressure, heart rate, (ECG, blood glucose, ...)

- easy to implement - difficult to deal with complications

- declining in some countries, increasing in others

- 10–30 % of dialysis patients internationally
dialysis patients by treatment method

USRDS 2004
being performed solely at home, peritoneal dialysis is a unique candidate for support via telematic services

- psychological support of patient via teleconferencing

- patient retraining

- evaluation of catheter exit site and oedema presence

- telemetry of vital sign and PD parameters that affect the effectiveness of the method

- cycler monitoring and (possibly) intervention to change prescription
current status

- Germany: videoconferencing for CAPD
  - patient consulting & psychological support

- Spain: videoconferencing to substitute visit to clinic
  - patient consulting, catheter exit examination

- Japan & Italy: videoconferencing & telemetry

- Fresenious (http://www.fmc-ag.com/) & Baxter (http://www.baxter.com/)
  - certain APD models include ability for cycler data telemetry
current status

- Project Phoenix, Washington, USA
  - haemodialysis, unit-to-office, teleconference + signs

- Saitama, Japan
  - APD & CAPD, home-to-unit, mobile phone, signs + teleconference

- Bonn, Germany
  - CAPD, home-to-unit, teleconference

- Spain
  - teleconference

- Milan, Italy
  - APD pediatric, home-to-unit, modem, cycler data + teleconference

- Diatelic Project, Nancy, France
  - experimental, biosings, intelligent alarms
current status

Baxter & Fresenious

- automatic telemetry of cycler data
- via a disk (offline) and/or via modem (online)
- include server application for patient data monitoring
- available only for certain APD cycler models
- provider specific - not standard based or interoperable
telecare for peritoneal dialysis

- useful in detecting and solving technical problems
- low cost
- easy to incorporate in clinic/patient daily routine
- saves hospital time and load
- satisfactory for patient - generally improves QoL

however

design considerations and technical limitations in existing solutions prohibit widespread use !!!!
requirements (not currently met)

- telemetry of any parameter: biometric, vital sign, PD scheme specifics, cycler data,

- support of both CAPD and APD

- support various types of communication (mobile telephony, data network, standard telephony, etc)

- modular design, based on standards (generic middleware standards to allow interoperability among third party providers)
PERKA: Telecare for Peritoneal Dialysis

- competitive R&D grant funded by the
  - Regional Operational Programme, East Macedonia and Thrace, Ministry of Development, Greece
  - European Regional Development Fund

- project specifics
  - duration: 2006-2008
  - budget: 640,000 €
  - Scientific Coordinator: Prof. V. Vargemezis, DUTH
  - Partners: Alpha (www.alphait.gr)
    Vidavo (www.vidavo.gr)
    Exedron (www.exedron.com) subcontractor
supporting APD & CAPD

- patient telemonitoring
- intelligent alarms
- archiving, processing and management of patient telemetric data
- statistics and data mining

telemetry of
- peritoneal dialysis schema data
- patient weight
- blood pressure
- heart rate
- ...

other clinical information systems
PERKA

PERKA Data Center

1. Patient data
2. Data collection & data processing Web Service

Internet

XML/SOAP

Patient Unit

1. Telemetry data
2. Medical devices

PERKA portal

HTTPS

1. HTTPS
2. Patient
3. Medical personnel
server application - patient data
server application - measurement definition
server application - measurement definition
server application - PD prescription
server application - telemetry data view
patient unit - PDA
patient unit - PC
patient unit - PC
work funded under the R&D grant

“PERKA: Telecare Service for Peritoneal Dialysis”

Regional Operational Programme, East Macedonia and Thrace, Ministry of Development, Greece

European Regional Development Fund