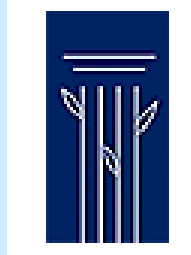


# Practical Applications of Activity Monitoring in Elderly Care

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Paula Paavilainen

RN, M.Sc. (Public Health)

Research Fellow, Tampere School of Public Health  
University of Tampere, Finland

# Demographic Transition

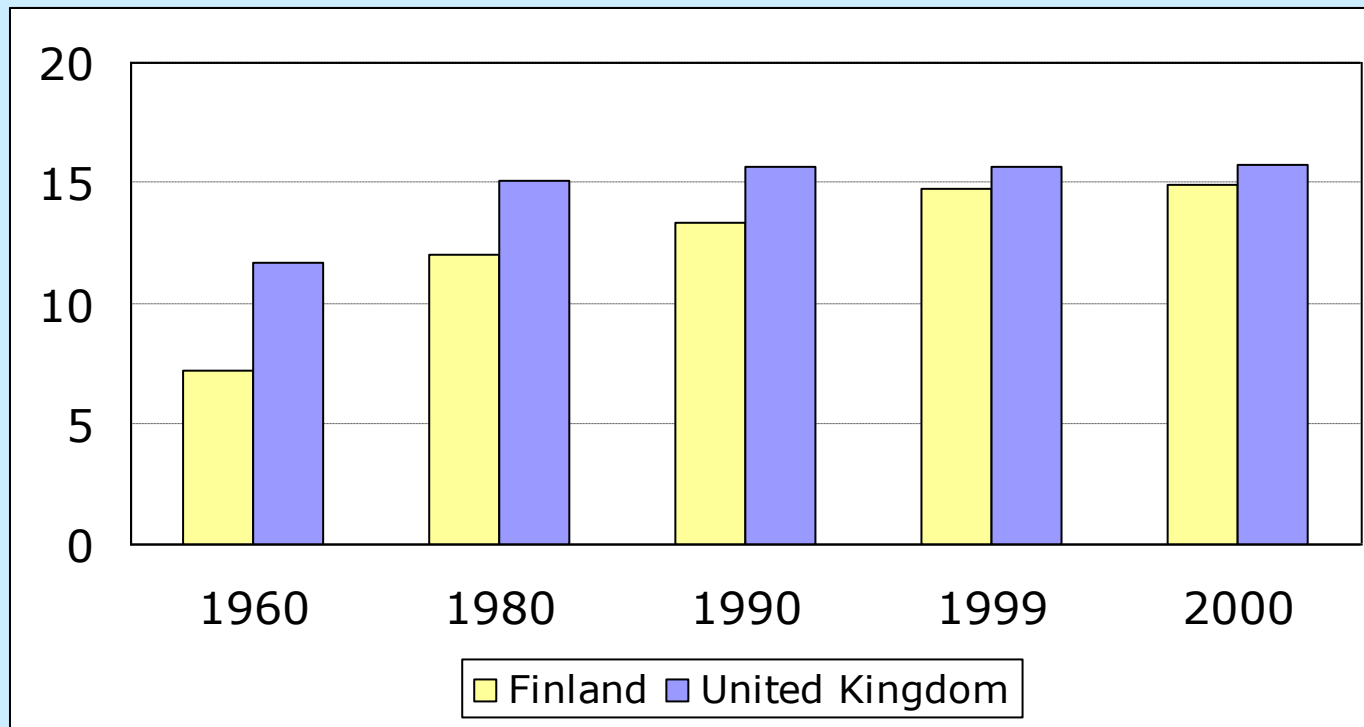
- People are living longer, and the number of elderly people (65 years and over) is growing.
- The likelihood of surviving not only to old age but also to very old age has increased markedly.

# Life Expectancy at Birth in Years

	1960	1960	1980	1980	1990	1990	1999	1999
	Females	Males	Females	Males	Females	Males	Females	Males
<b>Finland</b>	72.5	65.5	77.6	69.2	78.9	70.9	81	73.8
<b>United Kingdom</b>	73.7	67.9	76.2	70.2	78.5	72.9	79.8	75

Source: OECD Health Data 2002 4<sup>th</sup> edition

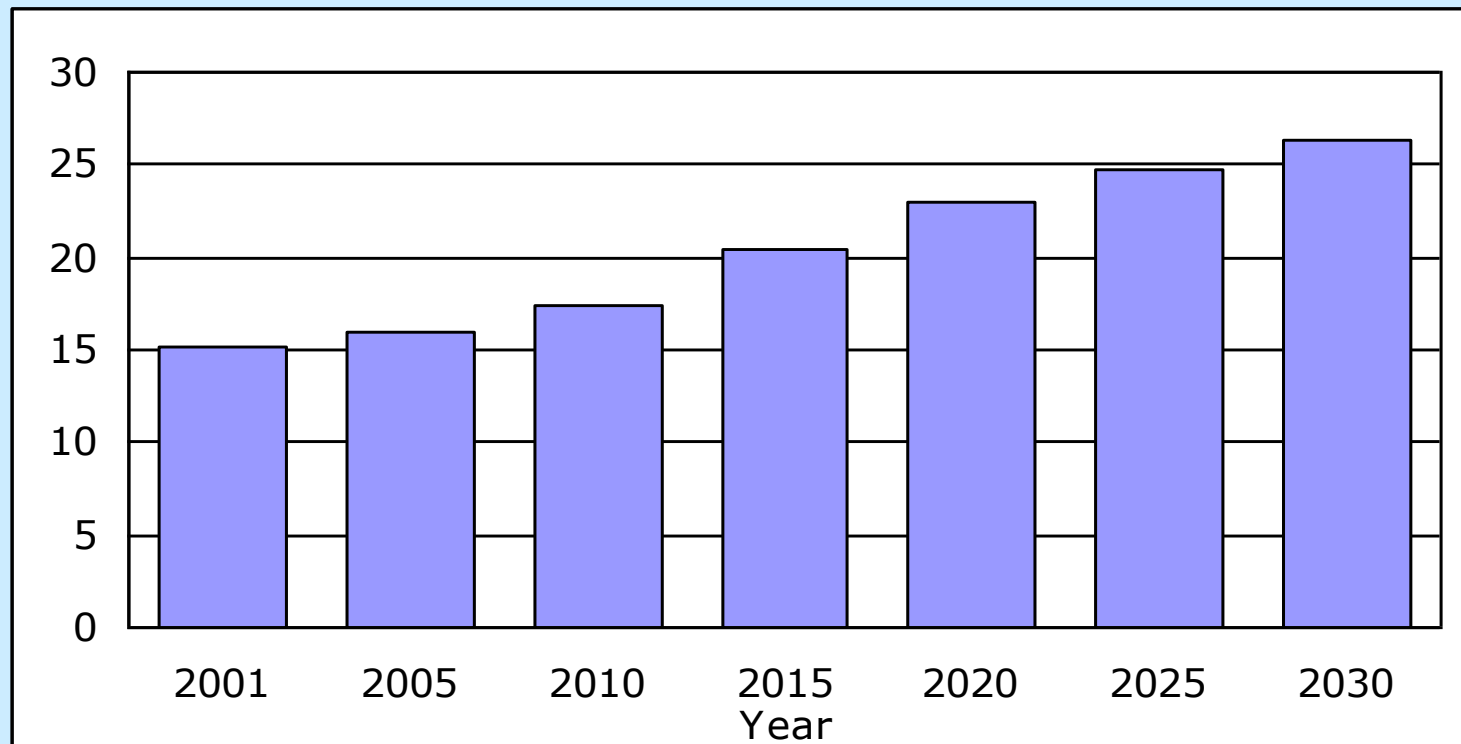
# Population 65 Years Old and Over - % of Total Population



Source: OECD Health Data 2002 4<sup>th</sup> edition

# Population Projection for 2001-2030 in Finland

65 years and over, % of total population



Source: Statistics Finland, 2002

# Facts

- The number of elderly people is growing.
- The number of diseases is increasing with age.
- Incidence and prevalence of some specific age-related diseases, e.g. dementia, are increasing.
- The more there are elderly people, the more public social services and health care services are needed.

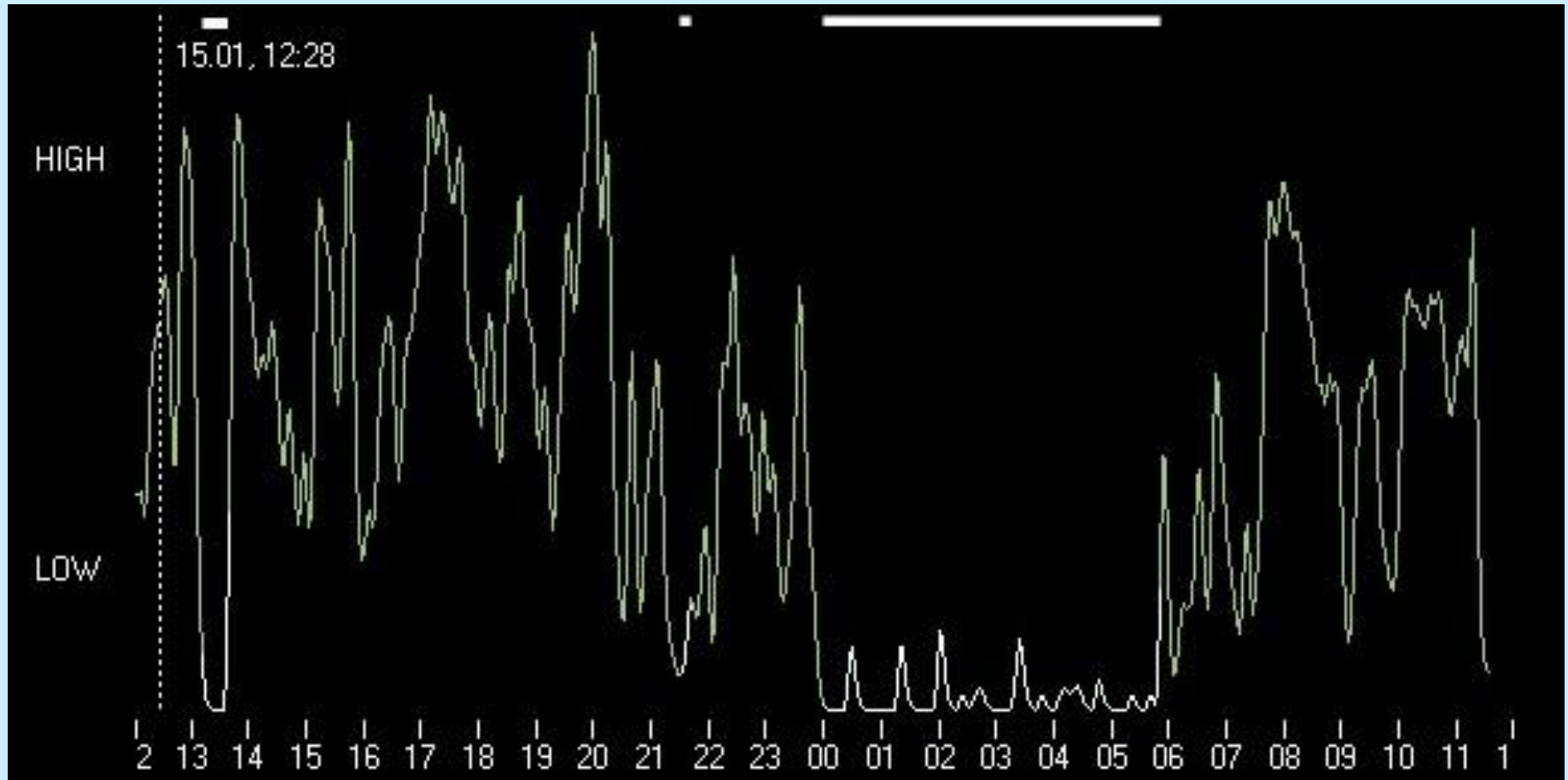
- “The social, economic and health-care consequences of demographic transitions will drive public policy in coming decades”.  
(Ref. Vaupel et al. 1998).
- New innovative technologies and services are also needed.

# The Need of New Technologies in Elderly Care Exists...

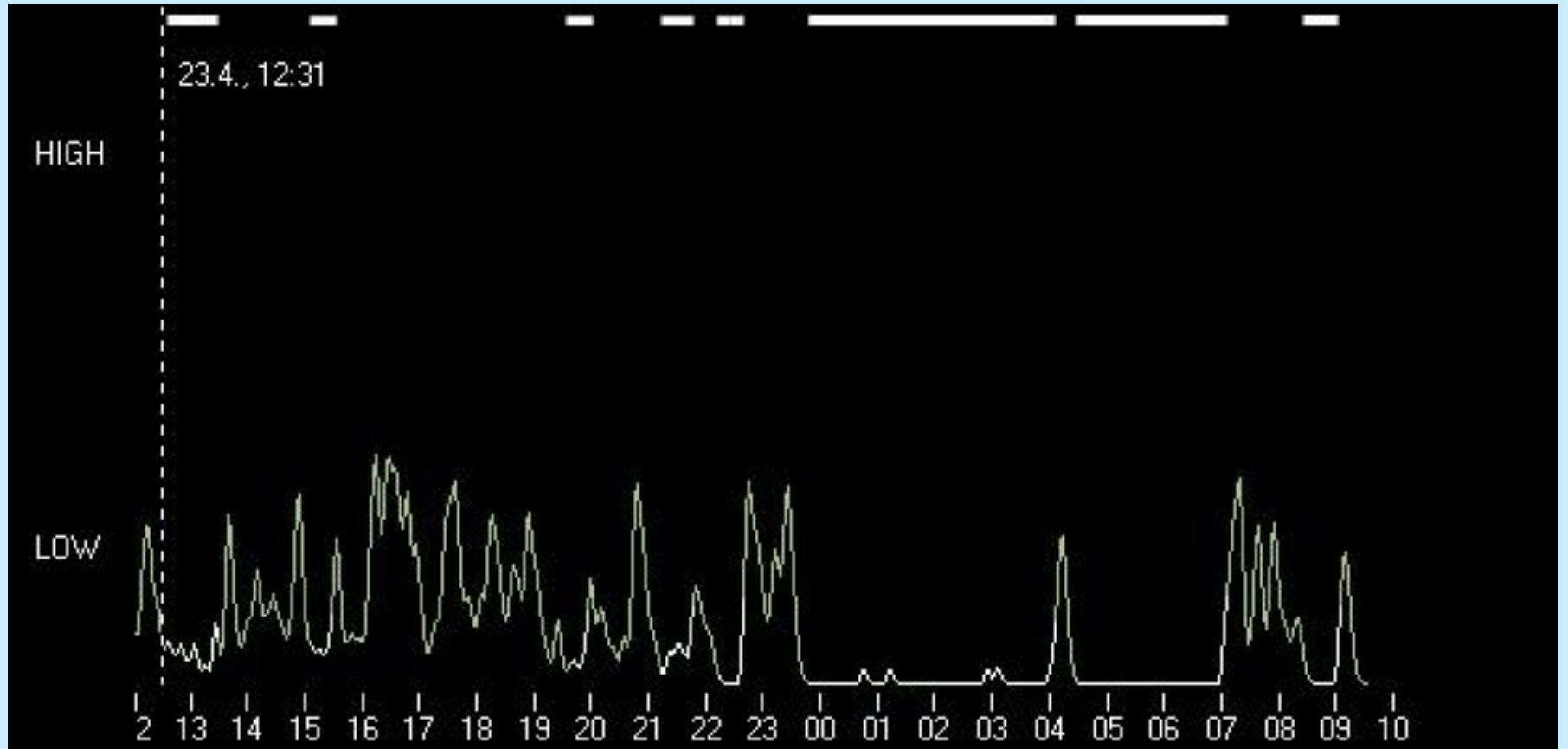
- in the institutions, e.g. in nursing-homes, assisting the delivery of care.
- in the community, enabling the elderly people to live independently in their own neighbourhood.
- Increasing the sense of security in both of these settings.



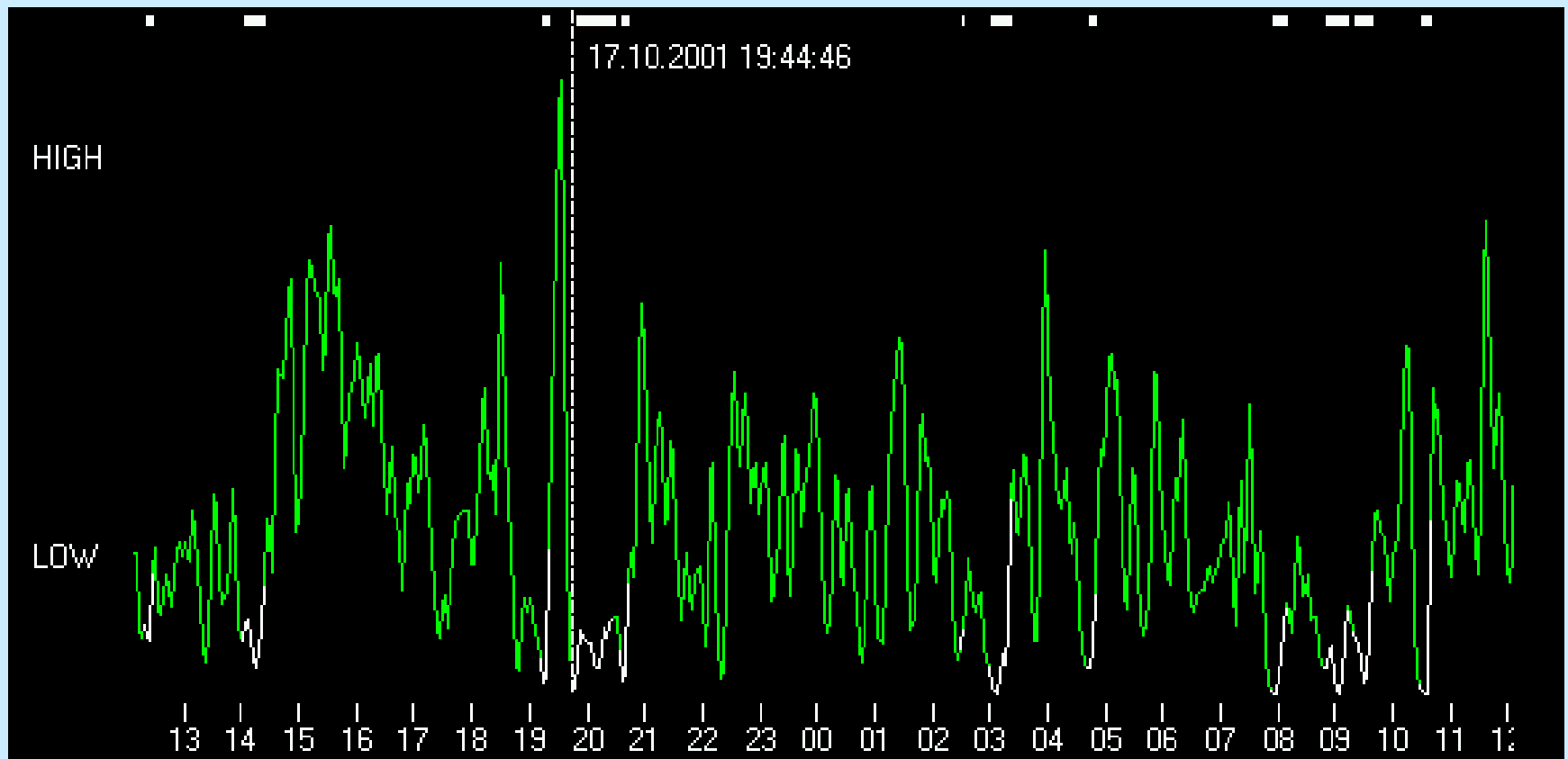
# Normal Day and Night Activity



# Deep Sleep



# Disturbed Day and Night Activity



# Learning to Use Activity Curves

- Choose one or two Vivago WristCare users whom you know well (symptoms, diagnosis, medication etc.)
- Observe their activity curves for one or two weeks
- During the follow-up
  - make notes of the events of daily life
  - observe the form of the curve at different times of day, e.g. at bedtime, at awakening, when dressing or eating

- Analyze the activity curve:
  - Is the curve similar at the same points of time every day, e.g. in the mornings, in the evenings?
  - Is the sleep-wake rhythm regular?
  - Does the person wake up and fall asleep at the same time every day?
  - Does the curve show the same activity level every day during the same daily routines?

- After you have learnt the activity curve of a particular person, it's easy to notice changes and differences in that person's activity curve.
- Changes in the activity curve (e.g. lower activity at day-time or changes in the normal night-time activity) may be signs of silent health problems, e.g.
  - depressiveness
  - infectious diseases

# Current Research Projects

- in collaboration with
  - Haaga Neurological Research Centre (MD, PhD Markku Partinen is the principal investigator)
  - VTT Technology
  - Tampere School of Public Health, University of Tampere

# Sleep in Old Age

- As a person gets older his or her sleep becomes more lighter, more fragmented and more variable in quality.
- Elderly people wake up during the night more often than younger person.
- These factors can lead to decreased activity and increased tiredness in the day-time.

- Sleep in nursing-home environment has been shown to be extremely disturbed and fragmented. (Ref. Ancoli-Israel et al. 2001.)
- Sleep has been shown to be more fragmented if a person suffers severe dementia. (Ref. Ancoli-Israel et al. 2001.)

# Sleep Study I

- The aim of this study is to find out how the activity curve produced by Vivago WristCare differs between demented and non-demented elderly people living in an institutional setting.
- The data has been collected during this autumn, and the data analysis is in process.

- In this study there are 27 elderly people living in a nursing-home.
- 13 of the subjects are demented and 14 are non-demented.
- The final results are not yet available, but so far the results show, that there are statistically significant differences in the activity curve between these two groups.

- Vivago WristCare is able to identify the different states of activity between demented and non-demented patients.

# Sleep Study II

- The aim of this study is to clarify possibilities to use Vivago WristCare as an instrument that
  - helps to monitor the sleep of the elderly more effectively and
  - helps to improve the quality of sleep and the activity of day-time of the elderly people in the institutions.

- The hypothesis of this study are:
  - Improving elderly people's sleep-wake rhythm, day-time activity and well-being is possible by paying extra attention to the quality of sleep.
  - These improvements in well-being can be seen in the activity curve produced by Vivago WristCare.

- This study started in November 2002 and it continues until February 2003.
- The study subjects include all residents of one nursing-home, 16 in total number and 14 of them are at least slightly demented.

- The quality of sleep and the day-time activity are improved with medical (e.g. changes in medication) and non-medical (e.g. sleep hygiene) ways of treatment.
- There is a team consisting a physician and a nurse of the nursing-home and a physician specialized in sleep.

- This team assesses the quality of sleep and the day-time activity of every resident every other week, and makes changes to the medication or to the care procedures, if needed.

- After this intensive 3-month intervention the improvements of the residents' well-being will be shown in the activity curve, too.
- The activity curve data is collected all the time, but the nursing staff and the doctors are not able to use the data during the study.

# Benefits of using the Vivago WristCare in Primary Care

- Only one device is needed (alarm system and activity monitoring in the same device).
- Online activity monitoring.
- Activity monitoring is possible in the familiar surroundings.

# Benefits ...

- Easy to learn, easy to use.
- Possible to use in the institutions and at homes, no need for many purchased systems in the local primary care organizations.

# Advantages in the Future

- Admission to a nursing home is often associated with sleep disturbances
  - Long-time follow-up of the activity curve makes possible to find out and treat sleep disturbances in time.
  - This helps avoiding an admission to a nursing home.

- Increase in functional disability of a elderly person living independently in the community is often leading
  - to increasing needs of social and health care services given at home or
  - to an admission to a nursing-home.

- Long-term activity monitoring makes possible to notice increasing disability of a person, because increase in functional disability often reduces the activity of that person.
- This decreased activity can be seen in the activity curve and it's possible to treat causes of increased disability in time.