Wireless mobile technologies facilitates home-based data collection and processing in large epidemiological surveys: results from the IMCA-HES Feasibility Study

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Abstract

Introduction: Health Examination Surveys (HES) are limited in Europe and most of them do not include measurements to assess chronic respiratory diseases (CRD) due to its methodological and organizational complexity. **Objective:** To assess the feasibility of using ICT Platform to perform interviews and home measurements in large scale surveys. **Methods:** The study had a a population-based cross-sectional and multi-center design carried out in 5 European centres. The study included individuals from 6 to 65 years old. GAL²LEN (adults) and ISAAC (children) questionnaires were used for data collection. Spirometry, blood pressure, pulse-oximetry, height and weigth measurements were performed using wireless mobile sensors. **Conclusion:** The ICT Platform allows to succesfully use WMT in large international epidemiological studies improving efficiency, acceptability and data completeness.

Background

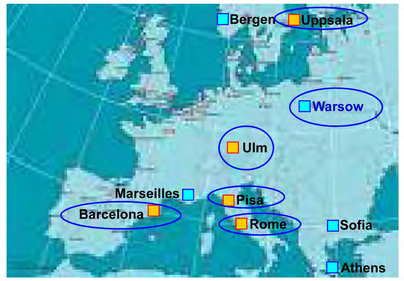
Wireless mobile technologies (WMT) are still not being used to perform home health interviews and measurements in the context of large epidemiological studies. DG SANCO is planning to implement a new European Health Examination Survey (HES) and is a priority to assess to what extent WMT can be used for the survey implementation and specially for the asessment of chronic respiratory diseases (CRD).

Aim

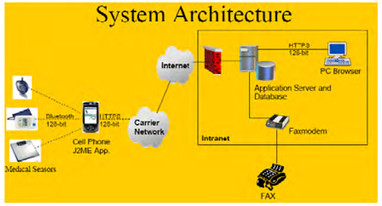
To assess the feasibility of using and ICT Platfom as a tool for performing interviews and measurements at home in the context of large scale respiratory surveys at national and international level.

Methods

The study has a a population-based cross-sectional and multicentre design carried out in 5 European cities: Barcelona (Spain), Uppsala (Sweden), Ulm (Germany, Pisa (Italy) and Rome (Italy). The sample was randomly selected from a population database and included individuals from 6 to 65 years old. GAL²LEN and ISAAC questionnaires were selected for data collection on respiratory disease and symptoms.



Measurements were performed using the following sensors: spirometry (NDD Easy One, 2001; blood pressure (UA-767BT, A&D Medical); pulse-oximetry (Nonin 400 Avant), height (Shoenle 5003) and weigth (UC-321PL. The new technological tool operating through a technological platform supporting chronic care was used for data collection and transmission



Results

Table I – Number of individuals with completed questionnaires and response rate by country.

	Adults	Children	Response Rate
	N	N	%
Barcelona	147	9	68
Pisa	70	38	64
Rome	40	2	13
Ulm	116	10	43
Uppsala	88	4	39

Table II – Description of the measurements performed in each country

	Barcelona	Pisa	Rome	Ulm	Uppsala
Blood pressure	Yes	Yes	Yes	Yes	Yes
Weight	Yes	Yes	Yes	Yes	Yes
Height	Yes	Yes	Yes	Yes	Yes
Pulse Oximetry	Yes	Yes	Yes	Yes	Yes
Spirometry					
Pre – BD	Yes	Yes	Yes	Yes	Yes
Post – BD	Yes	No	No	Yes	Yes
Blood extraction	Yes	Yes	Yes	Yes	No

Table III – Proportion of individuals with completed questionnaires that accepted measurements performance by country

	Barcelona	Pisa	Rome	Ulm	Uppsala
	%	%	%	%	%
Blood pressure	98	92	100	99	98
Weight	98	94	100	99	98
Height	98	93	100	99	98
Pulse Oximetry	98	94	100	99	98
Spirometry					
Pre – BD	96	89	100	99	98
Post – BD	85	-	-	-	79

Strengths and limitations of the new technological tool

- The new technological tool integrates questionnaire and measurements data collection avoiding mistakes in the data entry process.
- Allows the performance of home measurements and all collected data can be transmitted in real time to a central server either at national or international level.
- The system has a fieldwork management tool that allows to schedule visits and fieldwork monitoring at international level.
- It is easy to develop questionnaires but it still needs improvements on the definition of variables and export formats.
- The use of WMT is very promising in the field of epidemiology but still is limited with regard to the number of sensors available and depends on the interoperability between the system with different market devices.

ICT platforms and WMT may help to perform home measurements but the acceptability of measurements and response rates may depend more on sampling framework and cultural issues.

Conclusion

The ICT Platform allows to succesfully use WMT in large epidemiological studies improving efficiency, acceptability and data completeness. However, the system still have limitations that need further development.

The project is supported by the DG SANCO grant agreement (2005121)