

## ORIGINAL PAPER

### Medical Errors in Cyprus: The 2005 Eurobarometer Survey

**Andreas Pavlakis, RN, PhD**

Open University of Cyprus, Faculty of Economics and Management, HealthCare Management, Nicosia, Cyprus  
Cyprus Institute of Biomedical Sciences (CIBS), Department of Occupational and Environmental Medicine,  
Nicosia, Cyprus

**Elpidoforos S. Soteriades, MD, ScD**

Cyprus Institute of Biomedical Sciences (CIBS), Department of Occupational and Environmental Medicine,  
Nicosia, Cyprus  
Harvard School of Public Health, Department of Environmental Health, Environmental and Occupational  
Medicine and Epidemiology (EOME), Boston, MA, USA

**Correspondence:** Elpidoforos Soteriades, MD, SM, ScD. Cyprus Institute of Biomedical Sciences (CIBS)  
Department of Occupational and Environmental Medicine, 2 Antigonis Street, 2035 Strovolos, Nicosia,  
Cyprus. Email : esoteria@hsph.harvard.edu

#### Abstract

**Background:** Medical errors have been highlighted in recent years by different agencies, scientific bodies and research teams alike. We sought to explore the issue of medical errors in Cyprus using data from the Eurobarometer survey.

**Methods:** Data from the special Eurobarometer survey conducted in 2005 across all European Union countries (EU-25) and the acceding countries were obtained from the corresponding EU office. Statistical analyses including logistic regression models were performed using SPSS.

**Results:** A total of 502 individuals participated in the Cyprus survey. About 90% reported that they had often or sometimes heard about medical errors, while 22% reported that a family member or they had suffered a serious medical error in a local hospital. In addition, 9.4% reported a serious problem from a prescribed medicine. We also found statistically significant differences across different ages and gender and in rural versus urban residents. Finally, using multivariable-adjusted logistic regression models, we found that residents in rural areas were more likely to have suffered a serious medical error in a local hospital or from a prescribed medicine.

**Conclusion:** Our study shows that the vast majority of residents in Cyprus in parallel with the other Europeans worry about medical errors and a significant percentage report having suffered a serious medical error at a local hospital or from a prescribed medicine. The results of our study could help the medical community in Cyprus and the society at large to enhance its vigilance with respect to medical errors in order to improve medical care.

**Keywords:** Medical errors, Population survey, Eurobarometer, Cyprus,

#### Introduction

Medical errors constitute an important challenge for health care professionals, and health policy makers around the world. According to recent reports, medical errors account for a significant number of unintended adverse consequences for both hospitalized and/or ambulatory patients [O'Hagan et al.,

2009; Kermode – Scott, 2005; Brennan et al. 1991]. A recent Institute of Medicine (IOM) study reported that about one hundred thousand deaths may be attributed annually to medical errors in the US. [IOM, 2008] Furthermore, a report from the United Kingdom on the National Health Services hospitals, estimated that the cost of medical negligence was

increasing at a rate of 7% yearly during the 90s, while the cost of financial compensation for medical errors was estimated to be more than 400 million pounds in 2003 [NHS, 2004; Aspden et al., 2008; Fenn et al., 2000].

Health care research and innovation in the past decades have mainly focused on biomedical interventions based on modern technology however error prevention in the health industry remains a relatively new field of research [Poon et al., 2010; Bates, 2000]. Health systems and health policies across the European Union are becoming more and more interconnected aiming towards a universal goal of harmonization across Europe. [White Paper together for Health, 2010]. Such an ambitious goal raises many health policy issues, including health care quality and prevention of potential medical errors. Health care professionals perform different interventions on a daily basis with a clear intention to benefit patients however such procedures may occasionally lead to adverse health consequences causing unintentional harm. Errors in can occur at any level of medical care (primary, secondary or tertiary) [Dückers et al., 2009], could be attributed to any category of health professionals – physicians, nurses, pharmacists, paramedics [Ladd, 2010; Lankshear et al., 2008] – and may be associated with any stage of the treatment process such as an inappropriate prescription [Bates et al., 1995; Leape et. al., 1995], incorrect or delayed laboratory results [Otto, 2011], wrong diagnosis and/or improper or inadequate treatment. Furthermore, errors may occur within hospitals or in other health care settings such as physicians' offices, nursing homes, pharmacies, urgent care centers and care delivered at home, however very little data exist on errors occurring out of hospitals, [Loncarek, 2008] while the recent IOM report indicated that many errors are likely to occur outside of the hospital setting. The European Commission aiming at securing the safety and improving the quality of care for patients in all EU Member States through sharing information and expertise, has taken important steps towards the above goal including the April 2005 "Luxembourg Statement on Patient Safety" providing recommendations at the EU level, the

national level and the level of health care providers [EU, 2005]. However, the problem of medical errors has not been well studied at the EU level in a systematic fashion and the special Eurobarometer on medical errors was a first step towards the above goal. [Ec. Europa, 2010]

The objective of our study was to examine the knowledge, attitudes, and beliefs on medical errors as well as explore the experiences reported in the special Eurobarometer survey on medical errors in Cyprus. In addition, we compared the results with the corresponding findings from the other European Countries.

### Methods

The Eurobarometer constitutes a European-wide public opinion surveillance system through which, the European Commission evaluates, among others, beliefs and attitudes of Europeans on a broad array of social issues across the European Union member states, either on a periodic or on an ad-hoc basis, using a standardized and uniform methodology. The survey on medical errors constituted a special Eurobarometer survey requested by the Directorate-General of Health and Consumer Protection with an aim to obtain reliable data, which would inform relevant policy on patient safety [Poon et al., 2010].

### Study sample

The special survey on medical errors was conducted in the fall of 2005 and covered the population of 15 years of age or older of all European Union (EU-25) member states as well as the acceding countries. Survey participants were selected based on a random multi-stage sampling design. In each country, a number of sampling units was drawn with probability proportional to population size and to population density based on geographical regions and the distribution of the population with respect to metropolitan, urban, and rural areas.

### Data collection

Data collection in Cyprus was performed by the Synovate research group following a standard methodology as described above. In each of the selected sampling units, a starting address was

drawn at random. Further addresses were selected by standard random-route procedures based on the initial address. In each household, the respondent was drawn at random following the closest-birthday rule. All interviews were conducted face-to-face in people's homes. Data were captured using computer assisted personal interview (CAPI) technology.

### Questionnaire

Data were collected using a standardized questionnaire which included a number of demographic characteristics as well as additional questions on attitudes of people on medical errors and questions on their experiences with respect to this important problem. For example, the questionnaire examined the general perception on medical errors, the relative experiences of participants on medical errors and the overall confidence on health professionals expressed by the participants' trust in health care professionals and hospital-based treatments. Specifically, questions on medical errors included the following: a) How important a problem do you think medical errors are in Cyprus today?, b) Have you or a family member suffered from (i) a serious medical error in a local hospital? and/or (ii) a serious medical error from a medicine that was prescribed by a doctor? and/or c) all in all, how worried are you to suffer a serious medical error?

### Statistical Analyses

Raw data for Cyprus as well as cumulative data for the European Union were obtained from the Central Archive for Empirical Social Research, GESIS Institute. Statistical analyses were performed using SPSS 16.0. Chi-square and t-test were used to examine the distribution of different demographic and other baseline characteristics with respect to medical errors. Logistic regression was utilized in order to

evaluate the association between certain demographic and population factors and the risk of suffering or experiencing a serious medical error in a local hospital or from a prescribed medication. The level of statistical significance was considered a p-value less than 0.05 and all tests were two sided.

### Results

A total of 502 individuals participated in the Cyprus survey. Forty-three percent were males, while 13.7% were between 15 – 24 years old, 21.5% were between 25 – 39 years old, 26.5% were between 40 – 54 years old and 38.2% were 55 or older, respectively. Thirty five percent resided in a rural area, while 65% were from small and medium-size cities. Among responders, 21.5% had household duties, 20.5% were manual workers, 15.3% were white collar workers, while managers and self-employed accounted for another 20.4%. Retired individuals were 17.3% of the total sample and unemployed participants were 3.4%. Sixty-eight percent of the study sample reported being married, 16.9% were single, 5.4% were widowed and 4.6% were divorced.

About 90% of study participants, reported that they had often (45.3%) or sometimes (44.3%) read or heard about medical errors in Cyprus. A similarly high proportion considered medical errors to be a very important (43.0%) or a fairly important (41.6) problem in Cyprus. In addition, 22.4% reported that a family member or they had suffered a serious medical error in a local hospital, while 9.4% reported a serious problem from a prescribed medication. In Table 1 we summarize the above findings in comparison with the corresponding summary results from Greece, the other European Union countries, the European country with the highest percentage for each corresponding parameter and the Turkish Cypriot community.

Table 1: Perceptions / Experiences of Europeans on Medical Errors

| Question                                                                                                   | European Union (25)<br>% | Cyprus<br>% | Greece<br>% | European Country with the Highest Percentage (%) |
|------------------------------------------------------------------------------------------------------------|--------------------------|-------------|-------------|--------------------------------------------------|
| How often have you read or heard about medical errors?                                                     |                          |             |             |                                                  |
| Often                                                                                                      | 34                       | 45 (35)*    | 61          | Greece (61)                                      |
| Sometimes                                                                                                  | 44                       | 44 (36)*    | 29          | Netherlands (56)                                 |
| How important medical errors are in your country?                                                          |                          |             |             |                                                  |
| Very important                                                                                             | 38                       | 45 (42)*    | 52          | Italy (61)                                       |
| Fairly important                                                                                           | 40                       | 40 (25)*    | 35          | Netherlands (51)                                 |
| How worried about serious medical errors are you?                                                          |                          |             |             |                                                  |
| Very worried                                                                                               | 10                       | 22 (29)*    | 22          | Lithuania (27)                                   |
| Fairly worried                                                                                             | 30                       | 31 (25)*    | 49          | Greece (49)                                      |
| How worried are you about serious medical errors for hospital patients?                                    |                          |             |             |                                                  |
| Very worried                                                                                               | 12                       | 31 (28)*    | 28          | Cyprus (31)                                      |
| Fairly worried                                                                                             | 36                       | 35 (26)*    | 47          | Italy (52)                                       |
| Have you or a family member suffered a serious medical error in a local hospital? (yes)                    | 18                       | 22 (20)*    | 13          | Latvia (32)                                      |
| Have you or a family member suffered a serious medical error from a medicine prescribed by a doctor? (yes) | 11                       | 9 (16)*     | 9           | Latvia (23)                                      |

(x)\* Parentheses represent the percentage reported by the Turkish Cypriot Community in Cyprus

Table 2: Reported Parameters of Medical Errors by different demographic variables in Cyprus

| Demographic variables | How important problem medical errors are in your Country (very and fairly important problem) (%) | Reported Medical Error suffered at a local hospital (Yes) (%) | Reported Medical Error suffered from a prescribed medicine (Yes) (%) | All in all how worried are you that you will suffer a serious medical error (very and fairly worried) (%) |
|-----------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Age                   |                                                                                                  |                                                               |                                                                      |                                                                                                           |
| 15 – 24 years         | 89.7                                                                                             | 11.6                                                          | 4.4                                                                  | 48.5                                                                                                      |
| 25 – 39 years         | 85.2                                                                                             | 29.9                                                          | 14.0                                                                 | 57.0                                                                                                      |
| 40 – 54 years         | 88.0                                                                                             | 23.3                                                          | 9.8                                                                  | 56.1                                                                                                      |
| 55+ years             | 80.1 †                                                                                           | 21.4 *                                                        | 8.4                                                                  | 54.2                                                                                                      |
| Gender                |                                                                                                  |                                                               |                                                                      |                                                                                                           |
| Male                  | 80.0                                                                                             | 23.3                                                          | 9.4                                                                  | 45.7                                                                                                      |
| Female                | 88.1 †                                                                                           | 21.7                                                          | 9.4                                                                  | 60.9 *                                                                                                    |
| Residence             |                                                                                                  |                                                               |                                                                      |                                                                                                           |
| Rural                 | 85.3                                                                                             | 28.1                                                          | 14.0                                                                 | 52.8                                                                                                      |
| Urban                 | 84.3                                                                                             | 19.2                                                          | 6.9 †                                                                | 55.5                                                                                                      |
| Education             |                                                                                                  |                                                               |                                                                      |                                                                                                           |
| 15                    | 85.0                                                                                             | 25.1                                                          | 9.0                                                                  | 55.1                                                                                                      |
| 16 – 19               | 83.6                                                                                             | 21.5                                                          | 11.3                                                                 | 58.6                                                                                                      |
| 20 +                  | 80.8                                                                                             | 23.9                                                          | 8.0                                                                  | 52.3                                                                                                      |
| Still studying        | 93.6                                                                                             | 14.6                                                          | 6.4                                                                  | 39.6                                                                                                      |
| No full-time ed.      | 100.0                                                                                            | 0.0                                                           | 0.0                                                                  | 66.6                                                                                                      |

\* p &lt; 0.05, † p &lt; 0.01

\* Dependent variable

**Table 3: Multi-variable logistic regression for the association between different variables and the risk of suffering a serious medical error at a local hospital or from a prescribed medicine**

| Variables          | Suffered a serious medical error<br>in a local hospital * | Suffered a serious problem<br>from a prescribed Medicine * |
|--------------------|-----------------------------------------------------------|------------------------------------------------------------|
|                    | Odds Ratio (95% CI) [p-value]                             | Odds Ratio (95% CI) [p-value]                              |
| Age                | 1.0 (0.98 – 1.01) [0.70]                                  | 0.98 (0.96 – 1.01) [0.26]                                  |
| Gender (females)   | 0.96 (0.59 – 1.58) [0.88]                                 | 1.12 (0.55 – 2.27) [0.75]                                  |
| Age left education | 0.98 (0.93 – 1.03) [0.37]                                 | 0.99 (0.93 – 1.05) [0.78]                                  |
| Residence (rural)  | 1.55 (0.99 – 2.42) [0.054]                                | 2.25 (1.19 – 4.24) [0.01]                                  |
| Occupation         |                                                           |                                                            |
| Manual             | 1.23 (0.67 – 2.27) [0.50]                                 | 1.27 (0.52 – 3.12) [0.60]                                  |
| House              | 1.42 (0.70 – 2.87) [0.32]                                 | 1.19 (0.45 – 3.20) [0.72]                                  |
| Unemployed         | 1.87 (0.50 – 6.98) [0.35]                                 | 2.33 (0.28 – 19.25) [0.43]                                 |
| Retired            | 1.24 (0.54 – 2.81) [0.61]                                 | 0.49 (0.16 – 1.56) [0.23]                                  |
| Students           | 3.44 (0.83 – 14.30) [0.08]                                | 2.91 (0.44 – 19.16) [0.27]                                 |

In Table 2 we present the distribution of different demographic variables with respect to medical errors. It is notable that there were statistically significant differences in the demographic variables regarding different medical error parameters. Furthermore, using logistic regression, we examined the relationship between different characteristics and the risk of suffering a serious medical error in a local hospital or from a prescribed medication (Table 3).

Finally, we examined the level of worry about medical errors in association with previous experiences. After adjusting for age, gender, residence, educational level and occupation, we found that participants were four and a half times more worried about medical errors if they had previously suffered a serious medical error at a local hospital [OR = 4.48 (95% CI 2.68 – 7.46),  $p < 0.001$ ] and were almost three times more worried if they had suffered a serious medical error from a prescribed medicine [OR = 2.86 (95% CI 1.41 – 5.81),  $p = 0.004$ ]. In both multivariable logistic regression models, women were more worried about suffering a serious medical error at a local hospital [OR = 1.82 (95% CI 1.17 – 2.83),  $p = 0.008$ ], or from

a prescribed medicine [OR = 1.76 (95% CI 1.15 – 2.71),  $p = 0.009$ ] compared to men.

### Discussion

A relatively small number of studies have been reported on the problem of medical errors at the European Union level and the special Eurobarometer survey represents the first coordinated effort to obtain relevant data on this important field across Europe. To our knowledge, this is also the first report on medical errors in Cyprus. Our study showed that about one in five Greek or Turkish Cypriots reported having suffered themselves or a family member from a serious medical error at a local hospital. Furthermore, about one in three Cypriots were very worried about serious medical errors for hospitalized patients and the percentage was the highest among all European countries. We also found statistically significant differences between males and females, different age categories, and comparisons of citizens residing in rural and urban areas with respect to being worried about, and/or having suffered from serious medical errors. However, in multivariable logistic regression analyses, place of residence (rural

versus urban) was the only parameter that retained statistical significance after adjusting for age, gender, education, and occupation. Finally, as expected, we found that having experienced a serious medical error at a local hospital or from a prescribed medicine was a strong predictor for being worried of future adverse events.

Our findings suggest that the problem of medical errors in Cyprus as well as in Europe is measurable and significant not only in numbers but also in severity as it is reflected on the percentage of residents reporting being worried about medical errors for themselves and for hospitalized patients. Similarly, it should be noted that survey participants have also rated the importance of this problem at relatively high percentages. Data from Table 1 show that countries from the North and South Europe are both listed in the highest percentage column for different variables, suggesting that the problem of medical errors is significant across Europe and transcends traditional boundaries from South to North and East to West. Furthermore, data on medical errors reported from Greece are very close to the percentages found in Cyprus, most likely reflecting the cultural similarities and perhaps a similar level of health care quality delivered. Another important observation is that people in both Greece and Cyprus report higher percentages as compared to the European average, at almost all parameters examined; a finding which requires careful consideration and analysis. Independent of the percentage-wise problem of medical errors on a population level, the issue of a fatal or non-fatal medical error for a particular family extends beyond the financial compensation and could not be assessed only on a monetary, technical or legal basis [Lynch, 2010; Fuller et al., 2009]. Such an issue needs to be taken into account in every effort to improve the quality of care not only from the health professionals' part but also from the patient – sufferer's perspective [Friele et al., 2008].

Our study is the first to report and compare attitudes and beliefs of Greek and Turkish Cypriots on medical errors, as well as provide a gross estimate of the percentage of patients reporting experiences from medical errors at a

local hospital or from a prescribed medicine. However, the findings of our study should be viewed with caution since they depend on individual reports from a survey, and they lack independent verification. Perhaps future efforts should utilize other independent sources of information on medical errors such as court cases and financial expenses related to medical errors in the public and private health sector as well as hospital records in order to approach the real picture. Another limitation of our study is the fact that the questionnaire used across Europe may not be appropriate in capturing cultural differences thereby limiting the ability to compare the results in an unbiased way. Furthermore, we are not aware whether there was a major medical error highlighted in newspapers and public media during the period of the survey administration in Cyprus (2005) that might have influenced the reported findings. Finally, our study is based on cross-sectional data and therefore suffers from the associated limitations of its design limiting our ability to comment on causative relationships.

In conclusion, we believe that our study provides significant information on the problem of medical errors in Cyprus in comparison with other European Countries and verifies that such a problem warrants focused and continuous attention from the medical community and the society at large in Cyprus and in Europe. We believe that our study highlights the importance of such a problem in Cyprus and thereby requires the development of appropriate and comprehensive policies, [ACEP, 2010] systems and processes to manage such a problem as well as suggests the need for educating health care professionals to actively engage in the improvement of patient safety. [Legido-Quigley et al., 2008; Firth-Cozens, 2004] Such an approach is likely to enhance the public confidence to the current health care system and improve the communication between patients and health care professionals aiming at an overall goal of a better and ever improving medical care in Cyprus, across Europe and around the world.

### **Acknowledgements**

We would like to thank Mr Meinhard Moschner for his valuable help in obtaining the

Eurobarometer data for Cyprus and Dr. Alexandra Petridou for her contribution in the statistical analyses. Also we would like to acknowledge Mrs. Yiolanda Ioannidou, researcher from Synovate Research Center for her logistical support.

### Key points

- Our study is the first to report findings from a European-wide survey on medical errors in Cyprus.
- We found that about one in five Greek or Turkish Cypriots or one of their family members reported having suffered from a serious medical error at a local hospital.
- Women were significantly more worried about suffering a serious medical error at a local hospital or from a prescribed medicine compared to men.
- Participants, who suffered from a medical error in the past, were four and half times more worried about a serious medical error at a local hospital.
- The problem of medical errors requires particular attention from both policy makers and health care providers in order to improve quality of care and patient safety.

### References

- ACEP (American College of Emergency Physicians). (2010). Disclosure of medical errors. Policy statement. *Ann Emerg Med*. Jul;56(1):80.
- Aspden P, Wolcott JA, Bootman L, Cronenwett LR (2008). Preventing Medication Errors. Institute of Medicine. National Press Academy. 7<sup>th</sup> Ed. 2008.
- Bates DW. (2000). Using information technology to reduce rates of medication errors in hospitals. *BMJ* 320:788-91
- Bates DW, Cullen DJ, Laird N, et al. (1995) Incidence of adverse drug events and potential adverse drug events. *JAMA* 274:29-34.
- Brennan TA, Leape LL, Laird NM, et al. (1991). Incidence of adverse events and negligence in hospitalized patients. *N Engl J Med* 324:370-6.
- Dückers M, Faber M, Cruisberg J, Grol R, Schoonhoven L, Wensing M. (2009). Safety and risk management interventions in hospitals: a systematic review of the literature. *Med Care Res Rev*. Dec;66(6 Suppl):90S-119S. Epub 2009 Sep 16.
- EC. Europa  
[http://ec.europa.eu/public\\_opinion/archives/ebs/ebs\\_241\\_en.pdf](http://ec.europa.eu/public_opinion/archives/ebs/ebs_241_en.pdf). Accessed on 20/12/10.
- EU 2005  
[http://www.eu2005.lu/en/actualites/documents\\_travail/2005/04/06Patientsafety/index.html](http://www.eu2005.lu/en/actualites/documents_travail/2005/04/06Patientsafety/index.html). Accessed on 20/12/2010.
- Fenn P, Diacon S, Gray A, Hodges R, Rickman N. (2000). Current cost of medical negligence in NHS hospitals: analysis of claims database. *BMJ*. 320(7249):1567-71.
- Firth-Cozens J. (2004) Organisational trust: the keystone to patient safety. *Qual Saf Health Care*.13(1):56-61.
- Friele RD, Sluijs EM, Legemaate J. (2008) Complaints handling in hospitals: an empirical study of discrepancies between patients' expectations and their experiences. *BMC Health Serv Res*.;8:199.
- Fuller RL, McCullough EC, Bao MZ, Averill RF (2009). Estimating the costs of potentially preventable hospital acquired complications. *Health Care Financ Rev*. Summer;30(4):17-32.
- Institute of Medicine (2008). To err is human: building a safer health system. Washington: National Academy Press, 7<sup>th</sup> Ed. 2008.
- Kermode-Scott B. (2005). US has most reports of medical errors. *BMJ*. (12); 331(7525): 1100.
- Ladd P. (2010). Disruptive doctors: when healers are the problem. *Tenn Med*. Apr;103(4):25-7.
- Lankshear A, Lowson K, Harden J, Lowson P, Saxby RC. (2008). Making patients safer: nurses' responses to patient safety alerts. *J Adv Nurs*. Sep;63(6):567-75.
- Leape LL, Bates DW, Cullen DJ, et al. (1995). Systems analysis of adverse drug events: ADE Prevention Study Group. *JAMA* 274:35-43.
- Legido-Quigley H, McKee M, Walshe K, Suñol R, Nolte E, Klazinga N. (2008) How can quality of health care be safeguarded across the European Union? *BMJ*. 26;336(7650):920-3.
- Loncarek K. (2008). Health of the Health System. Pilot, Swiss cheese, and cash machine. *Croat Med J*. 49(5):689-92.
- Lynch K. (2010) Medical errors, patient safety, and the law: ten years later. *Ann Health Law*. 19(1 Spec No):91-5.
- NHS National Accounts 2001-2003, The Stationery Office, April 2004.
- O'Hagan J, MacKinnon NJ, Persaud D, Etchegary H. (2009). Self-reported medical errors in seven countries: implications for Canada. *Healthc Q*. 12 Spec No Patient: 55-61.
- Otto CN. (2011). Patient safety and the medical laboratory using the IOM aims. *Clin Lab Sci*. Spring;24(2):108-13.
- Poon EG, Keohane CA, Yoon CS, et al. (2010). Effect of Bar-Code Technology on the Safety of Medication Administration. *N Engl J Med* 362:1698-707.
- White Paper together for Health.  
[http://ec.europa.eu/health/ph\\_overview/strategy/health\\_strategy\\_en.htm](http://ec.europa.eu/health/ph_overview/strategy/health_strategy_en.htm). Accessed on 23/12/2008.