FROM CEREBRAL PATHOLOGY TO SPACE-WEATHER AWARENESS: THE CROSS POINT

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Abstract: *The paper presents some results of the project "Heliobiology" (2011-2015) and indicates the first steps in the cooperation with the EC project TeleSCoPE.*

The "Heliobiology" reflects the intense interest towards the influence of solar activity on human brain and is especially interested on cerebral pathology and its potential correlation with solar activity and meteorological factors.

Space-Weather Awareness is usually focused at raising awareness of the potential impact of space weather on critical infrastructures in view of the growing risk of technological catastrophic events. At the same time, the impact of Space-Weather on human health is either totally neglected or underestimated.

The paper outlines an optional aspect of space weather awareness, i.e. the one focused on human health, what is necessary to be taken into consideration based on the achievements of the TeleSCoPE project (EAHC Contract Number: 2009 11 11) and how eHealth can contribute to space weather awareness for the benefits of citizens.

ОТ МОЗЪЧНА ПАТОЛОГИЯ ДО ПРОГНОЗА ЗА КОСМИЧЕСКО ВРЕМЕ

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Ключови думи: *мозъчна патология, космическо време, електронно здравеопазване*

Резюме: *Тази статия представя някои от резултатите на проекта "Хелиобиология" (2011-2015) и първите стъпки в сътрудничество му с проекта TeleSCoPE.*

Проект "Хелиобиология" отразява интереса към влиянието на слънчевата активност върху човешкия мозък и по-специално върху церебрална патология.

Прогнозата на космическото време обикновено е насочена към повишаване на информираността за потенциалното въздействие върху критично важни инфраструктури обекти и с оглед предотвратяване на риска от технологични аварии. Въздействието на космическото време върху здравето на човека обикновенно се пренебрегва или подценява.

Статията предлага поглед върху взаимодействието на прогназите за развитието на космическото време и възможностите предоставяни от електронното здравеопазване.

1. Introduction: Space-Weather Awareness

Space weather events are natural phenomena caused by solar activity that may have a variety of effects on technology. Space-Weather Awareness is usually focused at raising awareness of the potential impact of space weather on critical infrastructures in view of the growing risk of technological catastrophic events.

2. The Impact of Space-Weather on Human Health on Earth

The impact of Space-Weather on human health is underestimated. Studies revealed that it causes changes in the normal functioning of the central and vegetative nervous systems, cardiovascular system and cognitive performance to cite some:

- The number patients hospitalized for myocardial infarction, angina pectoris and cardiac arrhythmia during geomagnetic storms increases up to 2.5 times in comparison with the days without geomagnetic storms [1];
- A positive correlation between days of geomagnetic intensity and the number of persons admitted to a psychiatric hospital as well as 36.2% increase in the number of men admitted to hospital for depression in the second week after geomagnetic storms is revealed [2-3];

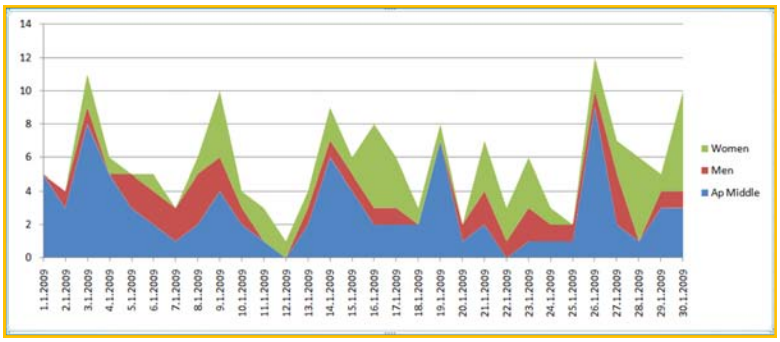

Fig. 1. Daily Ap index for January 2009 and numbers of patients' hospilized for ischemic cerebral infarction. More data available at: swh2012.cosmos.ru/sites/new.swh2012.cosmos.ru/files/presentations/SWH_2.21_Jorganova.pps

- A gender dependent correlation between peaks in suicide numbers and geomagnetic activity (Ap index) is found [4-5];
- Space weather events may be considered as possible triggers of suicide terroristic acts [6];
- The periodicities of cerebral infarction, cerebral hemorrhage and subarachnoid hemorrhage episodes, based on a large scale studies, resemble the periodicities found in the solar and geomagnetic activity [7-9] and (Figure 1).

Many other examples may also be provided but in sum: It is already accepted that:

- A subset of the human population (10-15%) is a bona fide hypersensitive and predisposed to adverse health problems due to geomagnetic variations;
- Extremely high as well as extremely low values of geomagnetic activity seem to have adverse health effects;
- Geomagnetic effects are more pronounced at higher magnetic latitudes.

Or, knowing how and how much the space weather can influence the daily health status is of extreme practical importance.

3. Solution: To Incorporate Space Weather Awareness into Telehealth Services

Telehealth is "the means by which technologies and related services at a distance are accessed by or provided for people and/or their careers at home or in the wider community, in order to facilitate their empowerment, assessment or the provision of care and/or support in relation to needs associated with their health (including clinical health) and well-being. Telehealth always involves and includes the service user or client" [10]. Telehealth is a new concept for increasing the quality of life and support of personal well-being.

Application of Telehealth into Space Weather Awareness practice must follow the European criteria, i.e. the European Telehealth Service Code of Practice. The latter is developed within the TeleSCoPE project (EAHC Contract Number: 2009 11 11), offers a quality benchmark and provides much needed guidance for telehealth and telecare service providers, clinicians, careers, purchasers and other interested parties. Its responds to the increasing number of calls for such a quality benchmark that arise from increasing healthcare needs due to demographic changes and the imperative to adapt service frameworks to respond to those needs. Draft of the Code is available at http://www.telehealthcode.eu/component/content/article/70. The critical areas that the Code is focusing are presented at Fig. 2.

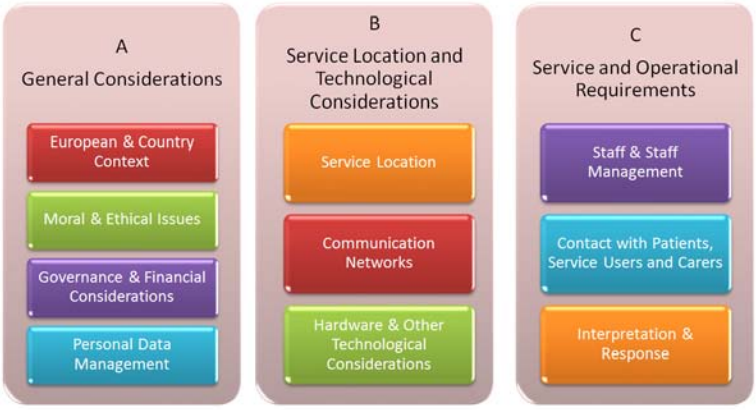

Fig. 2. Areas Addressed

The Code provides a framework by which service providers in all 27 member states of the European Union can aspire to or ensure the maintenance of minimum standards for telehealth services. It also gives the bases for regulation of telehealth services through appropriate monitoring and auditing. Thus the Code helps to nurture trust in a context of high quality telehealth service provision. On completion, therefore, the Code will provide a welcome framework to guide telehealth service providers in all 27 member states of the European Union as well as a potential basis by which telehealth services will be able to be certified and/or regulated.

The beta version will be released in April 2013 at the Med-e-Tel 2013 conference in Luxembourg. The final version will be published in the summer of 2013 at the project website www.telehealthcode.eu.

4. Why Telehealth Space Weather Awareness?

False Predictions of Space Weather Phenomena hitting the Earth at a specific day, widely published in some countries, including Bulgaria, may cause stress and force some people to

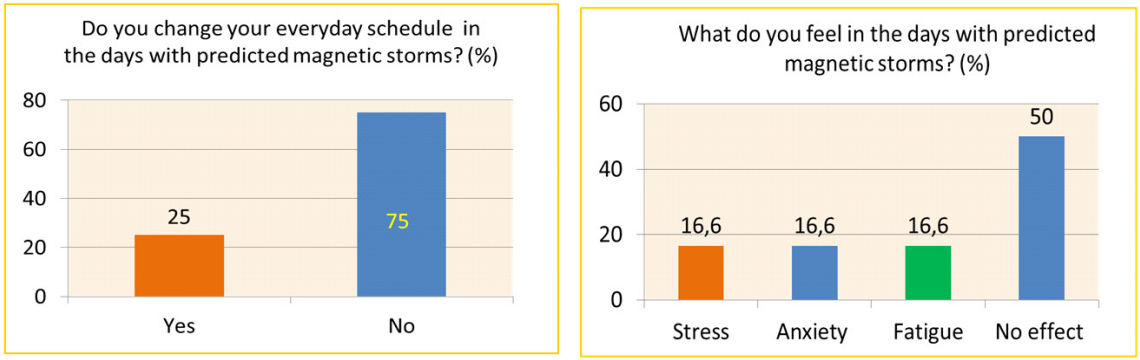

Fig. 3. False Predictions of Geomagnetic Storms as Stressors

reorganize their daily schedule. Preliminary results from our, still ongoing, survey demonstrate the harm of false predictions and the necessity of structured, standardized Telehealth Space Weather Awareness (Fig. 3).

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