

Implementation of Health Maps in Poland

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Abstract

In April 2015 came to force a new regulation of The Ministry of Health regarding healthcare maps and preparation of the General Polish Healthcare Map. During implementation process of this regulation several questions and problems about practical solutions in preparing of healthcare maps were raised. Collection of the required data, their analysis and presentation in current healthcare information system is difficult. Healthcare maps will require further regular current data supply and updates. Without unified system of data collection, required standards of data format and models of analysis and presentation, preparation and use of such maps may not be possible.

Key words: maps, healthcare maps, regional healthcare maps, General Polish Healthcare Map, GIS, HL7

Słowa kluczowe: mapy, mapy potrzeb zdrowotnych, regionalne mapy potrzeb zdrowotnych, Ogólnopolska Mapa Potrzeb Zdrowotnych, GIS, HL7



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On 14th of April 2015, a regulation of Ministry of Health of 26th of March 2015 came into force, which concerned the scope of content of health maps. Voivodes became responsible for development of both Regional Health Maps and the General Health Map of Poland. The maps will be a base for a purchase plan of medical services which will be used to define the type and number of purchased medical services. Thanks to the development of maps and chosen priorities, voivodes may not only hand down an administrative decision including an opinion concerning the reasonability of creating a new health facility on a given area, but also their further units. Health maps concern health services in both hospital and ambulatory treatment.

Conditions for development of health maps

In the law, the legislator mentions the expenses, mainly investments, that are related to submission of voivodes. Thus, a voivode will be able to change a decision ex officio “in the case of change in circumstances that influence its issuance” [3]. A healthcare provider,

who will not get a positive opinion, will not be allowed to take part in call of proposals of National Health Fund (NFZ). It should be emphasised that a positive opinion does not guarantee a contract to a health facility.

According to the regulation, Regional Health Maps and the General Polish Health Map should consist of: demographic and epidemiological analysis, stock and the use of resources as well as forecasts for demand for health services. Regional Health Maps should include annual data from 2 years before the current year. According to the regulation, a part of maps which concerns demographic and epidemiological analysis includes the analysis of:

- number of people in a voivodeship with a division into counties;
- structure of counties in comparison to structure of population in a voivodeship and whole country. The structure should include sex and age divides;
- average further continuance of life in a voivodeship;
- birth rate and coefficient of fertility in a voivodeship and counties based on 3-year data;
- density of population in a voivodeship and counties;

- deaths according to causes important from the perspective of public health in a voivodeship on the basis of the absolute number of deaths and death rate for 100 000 of people from 3 years in particular age groups;
- value of standardized mortality rate;
- value of prevalence rate in hospitals for 100 000 of people and incidence rate in particular voivodeships and counties;
- perinatal mortality in voivodeship.

The part concerning the analysis of stock and use of resources should include the following:

- number of providers;
- number of hospital beds in particular wards;
- number of hospital beds in the ratio to 100 000 people;
- bed occupancy rate and occupancy rate of medical apparatus;
- provided health services according to the International Statistical Classification of Diseases and Related Health Problems ICD-10 (triple character codification will be demanded) [1, 2];
- average stay of a beneficiaries at units providing services and the average wait for providing a service

The part of a map that concerns a forecast for demand for health services should include:

- forecasted populacy in a voivodeship and its counties;
- forecasted structure of populacy in particular counties in relation to the structure of populacy in a voivodeship and the whole country with sex and age divide;
- forecasted birth rate;
- forecasted death rate;
- forecasted demand for .

The data mentioned in the regulation is a closed list, which means that, for example, data for demographic analyses included in health maps can be based only on mortality rates, and not on morbidity or incidence rate. Another question, which was not really discussed before, is the use of information technologies to develop such maps and the question of technical and economic potentials that will let voivodes realize the postulates of the act and the regulation. What is more, some discrepancies in ways that several rates were calculated by authors of already released maps are also worth taking into consideration. The data concerning a forecast of morbidity for breast cancer include a statement: ‘(...) in 2009 there will be over 22,9 thousand new cases of malignant breast tumours in Poland’ [8]. On the other hand, the data presented in National Cancer Registry shows that the forecasted number of new cases of the disease will be lower [9]. A similar situation may be observed in the case of uterine cancer [8, 9].

Practical implementation of health maps

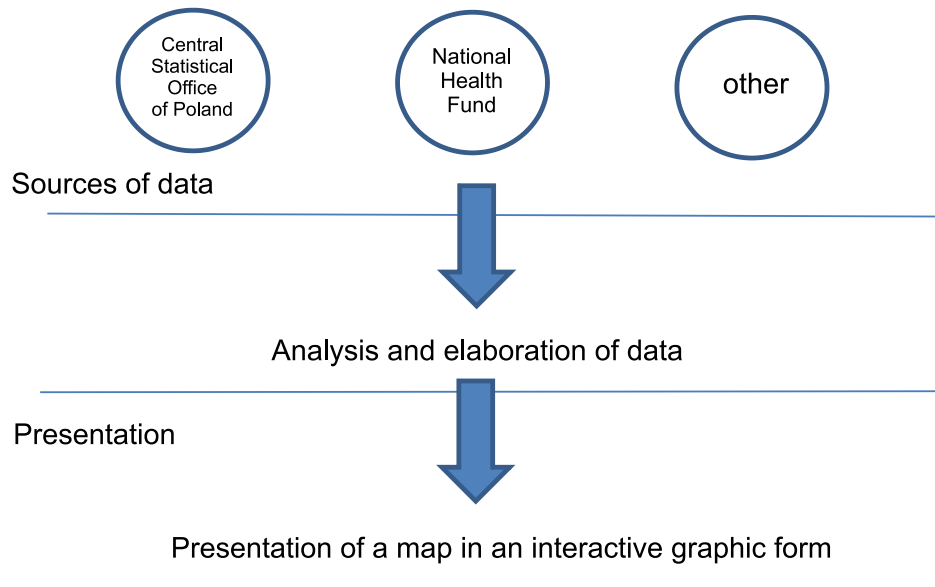
Epidemiological rules and methods are one of the most important tasks for public health and prophylaxis. Development of health maps, both regional ones and the Polish General Health Map, is a complex process. First of all, the data necessary for the analysis need to be collected. The main provider of data is NFZ, but demographic

data comes from Central Statistical Office of Poland. Other data, e.g.: morbidity, PYLL (potential years of life lost) or forecasts need to be calculated separately. Such rates as: Age-Period-Cohort (estimation of demographic and epidemiological rates) or PREDAAAP model and PREDMAP model (a forecasting model used to predict the occurrence of new cases of cancer, and other non-infectious diseases) are based on the algorithm developed by T. Hakulinen and T. Dyba. The method was proposed for calculation of estimated prognosis of demanded factors, with the assumption that morbidity has Poisson’s or extra-Poisson’s distribution in age brackets. Since the next group of data involves the analysis of the use of resources (according with regulation [3]), i.e. what is the possibility of signing a contract for both equipment and localisation, it may be assumed that the aim of the activity is to show the number of providers who realize signed health services. The number of health service providers may not be sufficient from the perspective of the various services. As a result, health maps should involve not only the information about the type of health service, but also the volume of contracts in relation to the potential of a provider, length of queues for services (the latter is obligatory according to the regulation). Except for the theoretical part, health maps must also include graphic representation of the data. So far, the institutions that developed regional maps (mainly the Ministry of Health), have not implemented a presentation of the data. The interactive features of such maps could be also significant. Such a form of presentation may also concern demographic, epidemiological and statistical data, e.g. forecasted birth rate in a particular area. The model of development of maps is presented in **Figure 1**.

One of solutions that may be used to present a health map is GIS (Graphic Information System) [5]. These systems are a result of work in geography and informatics which involved, among others, a territorial division of a particular geographical area (e.g. area of a commune, a county or a voivodeship). The use of graphical representation of the data on a map allows for clear presentation of big amount of data. Implementation of GIS may also involve presentation of objects (e.g. hospitals) and the distance from them to a given point or between the points themselves.

Plotting some information, for example demographic data, on a map without the knowledge about functioning of health care system may lead users to false conclusions [7]. Thus, the use of GIS requires understanding of the rules and methods, especially in the context of a query, testing hypotheses, cause-and-effect relationships, but also a critical assessment of such data, i.e. its quality and confounders. As a result, practical implementation of maps without the knowledge from such areas as: informatics, epidemiology or public health, seems to be a difficult challenge. It may be said that the minimum required for proper functioning of Regional Health Maps is: data, program and equipment. Obtaining the data mentioned in the regulation is not as easy as it seems to be. Collection of raw data from, for example, the Central Statistical Office of Poland and plotting it on a map (GIS)

Figure 1. The model of preparation of a health map



Source: Own elaboration.

is not a sufficient condition for the proper realization of postulates of regional health maps.

Regarding programs that may be used for graphical presentation of health maps, some factors are worth mentioning, and these are:

- data bases which include digital data (also data mentioned in the regulation);
- digital maps equipped with borders of counties and voivodeships, which allow for implementation of such data as: a distance in time from a particular specialist to a given point – **Figure 2** presents an example of 30-minute distance approach to a surgeon in Łochowo);
- information system which, for example, automatically connects data with maps keeping a distance on a set level. **Figure 3** presents the possibility of setting a type and category of service (here: a night shift within maximum 20 km form the defined point);
- possibility to implement *i-frame*, to externally implemented systems, which allow for presenting maps in other information systems, for example on portals of institutions from the health care sector.

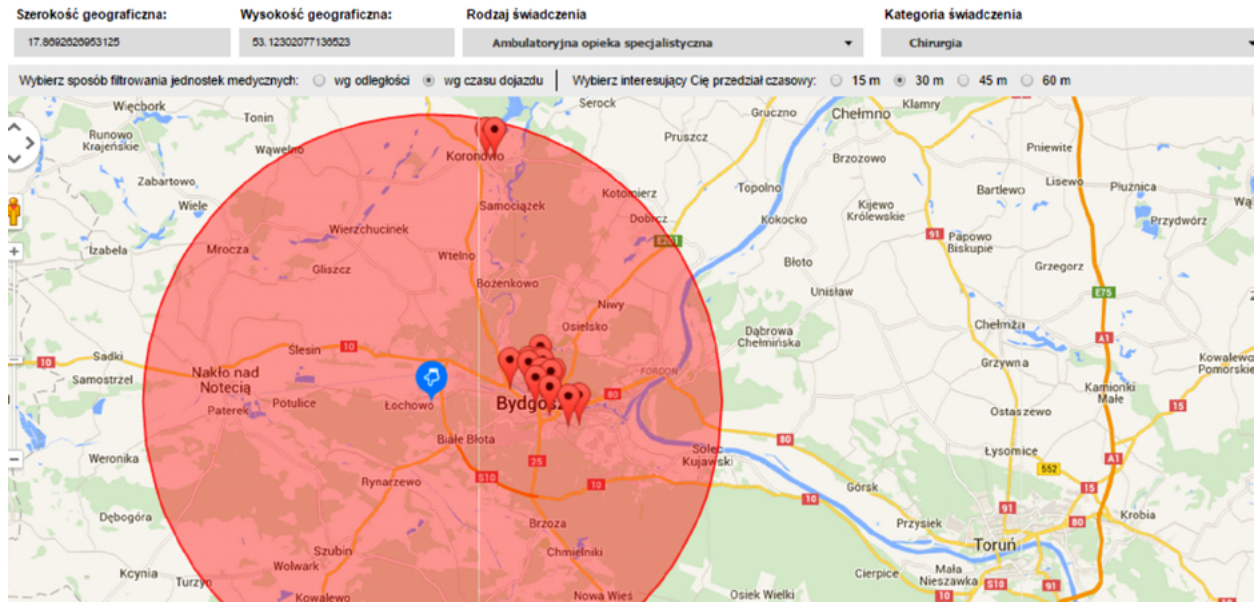
Figure 2 presents a potential time of approach to a given health care institution. A user may choose coordinates of his current position or his house. If he does not know the coordinates, he may choose the position with a computer mouse. Afterwards, it is possible to set the time of approach, kind and category of the service, e.g. usual care, spa treatment or hospitalisation. For a chosen kind of a service, it is also possible to choose its category. For example, in the case of usual care, the available categories are: a family doctor, sanitary transport, a health nurse, etc. Figure 3 presents a similar interactive map which includes similar data, i.e. kind of a service, cat-

egory, current position (in this case Łochowo). However, in this case, a user chooses the distance from the current position to an institution that he is looking for. The distance equates to the radius of a circle in which a given health care institution may be found.

The efficient functioning of health maps, especially regional ones, is ensured by their systematic update. Epidemiological data, forecasts and analysis of medical resources are variable and, according to the act [3], each institution which issues health maps must update them at least once a year. Thus, without an efficient updating system, the update may be relatively high-maintenance for an institution, both from the perspective of organizational and economic aspects. It is also significant that the data collected in various institutions (National Health Fund, Central Statistical Office of Poland, Ministry of Health) are saved in various formats. What is even worse, the bases in which the data is integrated have different structures. The lack of standardised format and transfer of medical data (for example HL7) inhibits efficient and bona fide implementation of health maps in Polish system of health care. As a result, there is an urgent need for implementation of the Electronic Health Record (EHR). Due to the Record, the data will be digital and uniform.

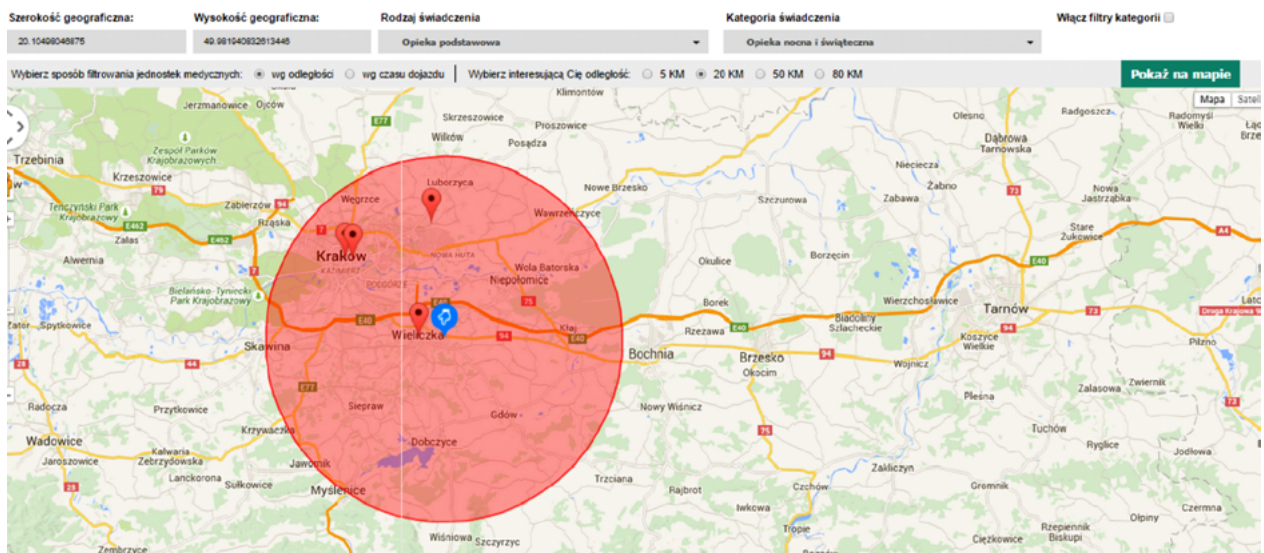
Maps including information about occupancy of medical equipment in particular voivodeships and counties are another element of the system of health maps. It is not only a question of the number and type of the equipment, but also the frequency of use and the queues of beneficiaries who wait for examinations carried out on them. This element of health care system is also important for estimations of health needs and should be included in maps.

Figure 2. An example of setting the time of approach according to the kind and category of a service



Source: S.E. Thrall, *Geographic information system (GIS) hardware and software*, "J. Public Health Manage Pract." 1999; 5 (2): 82–90 [4].

Figure 3. An example of setting a distance according to a type and category of a service



Source: S.E. Thrall, *Geographic information system (GIS) hardware and software*, "J. Public Health Manage Pract." 1999; 5 (2): 82–90 [4].

Independently of problems with data analysis and defined postulates, health maps may strongly influence the market of health care. They may be at the same time a significant help for some health care institutions, and a cause of many problems for others. The process of creating health maps is steady and continuously improved.

It should be emphasised that without the maps, it will be hard to win funds for hospitals (77 billion euro will be allocated until 2020). The maps are a fundamental tool that may help allocate the money according to real and accurate needs of voivodes. Until now, funds from European Union were mainly voted for purchasing medical

apparatus in regions without any analysis of needs in this range in relation to hospitals.

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