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Pool & spa management information system - a database for better information and supervision

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Synopsis

The title of this presentation refers to a comprehensive national database and a couple of associated data management modules that are primarily meant to serve the public health authorities in their task of supervising the health risk management of the pool and spa establishment. In addition to that, the system can also serve a number of ancillary functions as a single, unique source of data with relevance for consumer protection, cultural education as well as commercial and public information. Although the system is not yet completely functioning and the project is still partly in the phase of design, we are glad to have the opportunity to present its main features and expected value.

One may question the justification of a project like this: what is the added value of it with regard to its intended main function and what extra services it can, if once ready to operate, yield beyond those possibly tremendous sources of information that are nowadays spreading like the flue. The first section of this presentation is therefore aimed at answering these doubts by showing the advantages of the scheme over the existing structures and solutions and its proposed application for a variety of purposes. After that we provide a short introduction on the system's specifications and finally we are going to demonstrate through some examples its unique convenience for problem analysis and decision support. For the aim of this presentation the simplified notion of "pool and spa" is used for all public and semi public establishment that maintain at least one pool for the access of either all members of the public or of a restricted group of it in the meaning of the WHO Guideline.

I. What is to be achieved?

In Hungary of a population of 10 million there are at least 750 establishments that run one or more pool for public or semi-public access and the number of the pools is estimated to be about 2300. The owners and/or the directors of these establishments are obliged to operate the pools in accordance with the relevant regulations and above all the ministerial decree on the rules of operation of the public pool services. The decree sets stipulations on a number of conditions that are to be observed, among others on the preconditions for authorizing the construction of a pool and spa establishment, the water quality that is to be maintained, the water exchange and hydraulic, the maximum allowable bathers' load, the poolside supervision, the minimum vocational qualification of the personnel and a couple of rules regarding the ancillary infrastructure. The regulation also stipulates the duties of the local public health service in this regard, as overseeing the pool and spa establishments and taking measures if violation of the rules is detected and hazard for the public health is assumed. To enable the fulfilment of this task the operator is obliged to set up and have authorised by the public health institute a compilation of the domestic rules of procedures and the public health institute to at least once a year inspects all establishments. The results of the water tests that

the operator has to have performed by contracted, accredited laboratories are collected by the public health institutes and summarized in their annual reports together with a commentary on the major problems found.
On the basis of these arrangements the pool and spa establishments are expected to serve the public with the due observance of all the rules, and the public health system is supposed to be in control of the situation both on the local and the national level.

But the case is unfortunately not so easy. The public health inspector is overloaded and the time she or he is able to devote to the matter is too short to notice all mistakes or departures from the rules. The education and training of the public health personnel with respect to specific knowledge needed in this matter is also not always appropriate. The operators are short of time as well, and try and spare as much money as they dare and can often at the expense of the service performance or sometimes of statutory obligations. The annual reports are too general, often lacking concrete facts, and the tabulated regional test result summaries are almost useless for any particular actions or policy decisions.

The pool and spa management information scheme simply called “pool inventory” is to supply on-line and close to real time information on every single attributes and test results at the access of the local and regional public health institute, as well as the central public health authority and the advisory institute thereof, and will thus enable timely interventions of the competent authority on the field and targeted policy actions by the national authority and central governmental agencies if necessary. A prerequisite for this taking place is the appropriate modification of the relevant regulation inasmuch as the operator’s obligation to immediately upload all relevant alterations into the system should be clearly spelled out. This is not a major change from the present ruling, as the operator has already been obliged to keep records of all significant data of operation and events. The system is to be implemented via a thin client communication software and a connected database server to give authenticated access to all operators and laboratories performing the water tests to upload and revise data and to all public health institutes and the central pool-and-spa intelligence units to review, analyse and comment them as well as to devise and record all measures taken and to check their effect.

The potential exploitation of the system may well go beyond the above depicted range. The inventory may eventually ensure that the pool and spa services are underlying public scrutiny and consumer protection agencies and pressure groups gain access to relevant pieces of information. To be honest, all these establishments have in principle been under the effect of national and international obligations on the public information and involvement in decision making, but this obligation has been much more formal to date than in other environmental matters, e.g. in matters relating to the classical bathing waters. Who on earth has been able to know what the water she/he is bathing in is like, and who could instigate any measures to prevent fungi infection possibly acquirable by the local thermal pool? Up to now the only organization formally enabled to protect the health in strict sense but also the wider interests of the consumers of pool and spa services is the public health institute, and we do see how ineffectively. Therefore a separate section is planned for the system on the basis of prior discussion with the consumer protection agencies and professional associations of the pool and spa industry to contain appropriate information advising the public about the quality records of the services of all establishments. This single action may well achieve more

progress in the performance of the service by virtue of public control than the present efforts of the authorities.

One of the current shortcomings of the effective public health control is the lack of specific technical understanding of the processes involved in the pool and spa operation. The simple inspection and a list-based check is not always enough to find out the background of deviations. Another planned achievement of the system is a searchable knowledge advancement scheme that offers a wide array of pieces of technical information and advice.

The abundance in Hungary of thermal waters calls for their application for treatment of rheumatic and other diseases. The data on the mineral composition of these waters and their beneficial effect on application may also be made available for the public and for the social and private health insurance agencies for decision support.

Since all health and water quality relevant data on the pool and spa operations and their environmental background are going to be available and statistical analyses for a range of possible directions can be performed, the system can support policy decisions at all necessary levels: locally with pros and cons for an investment, regionally for the environmental management planning or about possible development support of health tourism and nationally for the legislation on management of thermal waters or national water management planning, as well as on allocations by development funds.

Finally the database can be supplemented on commercial basis so as to be available for both the domestic and the international tourism industry. A subscription-based service is planned to be offered to the pool and spa sector of hosting additional information about specific services provided or attractions available to promote the wellness and curative spa business.

II. How is the system built up?

The idea of the system was originally based on the target of obtaining meaningful data on the technical, operational and water quality attributes of all the pool and spa establishments from the single kindergarten splash pools to the thermal and sport complexes. This endeavour was fed also by several governmental and parliamentary interrogations on the national state of affairs that could never be properly satisfied. A circular and an attached questionnaire was then sent to all public health institutes advising them to fill in the latter and upload it to a file transfer protocol storage site wherefrom the data were retrieved and loaded onto a database server for further analysis and statistics. The SQL language-based query system is adapted from a laboratory information management system, and enable standard and programmable queries of a large number of possible relationships and interactions.

The original survey form is a partially protected Microsoft Office Excel 2003 sheet with a large number of questions. The data providers were advised to fill in the data of all pool and spa establishments on a separate tab of the sheet each. Accordingly, each tabs are equipped with a heading to contain the relevant attributes of the establishments, like the name, address and contact data of the owner and operator, the number of pools, the statutory capacity as number of users that can simultaneously held, and some facts of the recent supervisory actions by the public health authority. Below the data for each of the pools is to be filled in column-wise. The cells are to be filled in either via choosing by click one of the pre-defined answers or, less frequently writing in the proper amount or text.

The data on pools are organised in sections as follows:

- Baseline attributes, like size, shape, covering material, intended purpose of use and way of operation. For the intended purpose there are eight possible functions to be chosen (medicinal pool, common thermal pool, physiotherapy pool, swimming pool, learning pool or shallow swimming pool, spa pool or whirlpool, wave pool and finally a Hungarian speciality: not authorised thermal pool; in fact the number of the pool types has to be increased). The way of operation may be either circulated (and equipped with a water treatment regime) or fill-and drain where the used water is simply replaced at a high exchange rate. The latter type is allowed only to be used for medicinal waters among restricted conditions;

- Additional attributes, like the way of draining, the size of drain structures if applicable and being open air, indoor or divided;

- Sizes like surface, volume, greatest and average depth;

- Capacity (calculated according to the statutory requirements), daily freshwater replacement and for the fill-and-drain pools the frequency of complete water exchange;

- The way and some attributes of the water input, like bottom, long or short side, perimeter, extended features) and drainage (with special attention to the drain-grids aiming at preventing suction accidents);

- Technical features for circulated pools, like balance-tank, pumps, filters, chemical treatment and disinfection including the way of their dosing;

- Origin and attributes of the water used for filling in the pools including some pieces of information on the well or other source, and finally

- Summary of the data of water quality checks both microbiological and chemical and the most frequent cause(s) of non-compliance if any.

The Excel sheet was designed to accommodate data for as many as 40 pools and the tabs can be propagated in order to hold the data of all establishments under the competence of a single public health institute.

Unfortunately financial and managerial constraints prevented the database being fully developed and deployed but even then, in course of the time elapsed since its creation, several flaws of the questionnaire came to light, so it is to undergo slight modification and also, the organization of the survey form should be better adapted to the requirements of the database structure.

III. What information can be retrieved from the system?

There is quite a few data that can be interesting for local and national political and administrative bodies in order to have correct understanding of the availability and quality of pool and spa related services in a specific area or in the whole country. Questions like how many of the pools of different intended purpose are available, how is the simultaneous allowable bathers load (in comparison to demand calculated from other data sources), how

active the public health authorities in a specific area and time were, and a lot more can be easily retrieved from the inventory. Data on water quality and technical outfit related heath risks may also be of interest first of all in case of remorseful events picked up by the media or complaints by the public. A number of correlations may be supposed between technical features, data on compliance performance to administrative and legal provisions and water quality attributes in existing pool and spa establishments. Some of them are at least suspected by common sense but a sound statistical confirmation may favourably support policy decisions and can give rise to research and industrial development activities that would not be possible if considered groundless. We suggest here some possibly interesting associations of which a longer practice with the system may offer a lot more.

Number of physical accidents in comparison to the type of the establishment; to the intensity of supervision; to the number of pools in the establishment; to the material of the flooring, etc.

Number and type of water quality breaches according to type of water used, type of filtration, type of disinfection, way of dosing chemicals, water temperature, intended purpose, bather's load and a lot more.

Some unexpected relationships may flag problems that reflect changes in the underlying conditions the pool and spa establishments are operating among. An example may be a difference between the proportions of incompliant microbiological samples tested by the laboratories of the public health authorities vs. the private labs. The lower efficiency of the latter as reflected by a significant departure may call for considering the requirement for them of participating in a targeted proficiency scheme or a review of the accreditation procedure from this aspect. Other example may be the detection of the relationship between the comparatively high number of water quality breaches or public complaints vs. the registered diligence of the local public health service. This may advise the chief public health officer of the region or of the whole country to promulgate strict instructions to the service to improve its efficiency.

Temporal comparison across the use of the system for several years may reveal a sudden change in the proportion of finding a specific indicator or pathogen micro-organism more or in contrary less frequently than earlier. Through deeper investigation into the issue a drop or raise of the performance of the test method can be discovered as a result of the introduction of a new standard.

There are specific pool types that are supposed to be more prone to severe water quality deterioration and even adverse health implications than others, and by the use of the inventory it is possible to learn a lot of concrete facts about them and to advise legal and technical interventions if it looks necessary. The spa pools and other types of aerated-agitated pools are one example to be highlighted. Their prominent inclination to high microbial contamination including Legionella growth may be related to different factors, and among them the low quality materials built-in their structures.

Although the system is apparently far from being ready, tested, and ripe, I hope the above description of it could convince the audience about its prospective values and public benefits. We'd be happy to hear your opinion and would like to ask you to assist us in further

developing the system by any ideas or supposed or flaws detected while listening to this talk or thinking on the matter later.