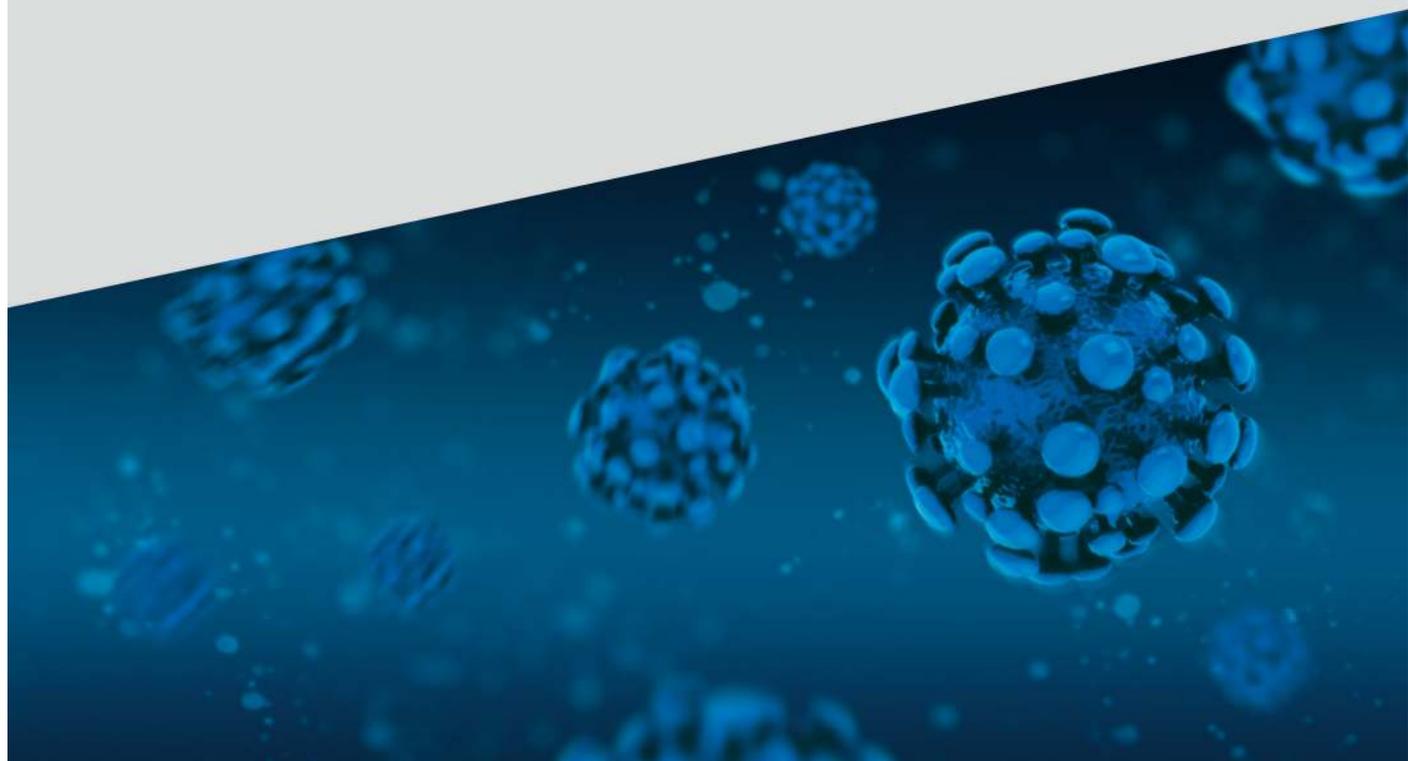


COVID-19

SWIMMING POOL STUDY

Prof. V. Romano Spica



'In 60 years of business, our company has built thousands of aquatic spaces all over the world, whether for sport, gatherings or fun. In all these years, we have been proud to have contributed, together with swimming federations, public and private bodies, to grow the culture of water. We felt responsible for the construction of swimming facilities suitable for the progression of all water activities but also designed to maximize pleasure and safety during these activities.

We spent a lot of time making sure that the recirculation in our pools could always guarantee a proper water speed and a uniformed distribution of cleaning agents.

In the face of the Covid-19 emergency, swimming pools - like many other sports centres and gyms - are now under a magnifying glass to better understand the risks of virus transmission both in common areas of use and - more specifically - in the water.

We therefore asked ourselves - like many others - about the possibility of short-term reopening of swimming pools and swimming centres and we thought about how we could contribute to a better understanding of the Covid-19 transmission risks in chlorinated water, typical of the swimming pool environment.

That being said, we decided to rely on the advice of one of the leading international scholars on the safety of swimming pool water and swimming facilities, Professor Vincenzo Romano Spica, Professor of Hygiene at the University of Rome "Foro Italico".

Prof. Spica shared a first outlook and evaluation of the current scenario, which we have put together in this document.

We then commissioned Prof. Spica to carry out a scientific study - supported by laboratory tests currently underway - which can help us to draw some objective conclusions about the survival of the virus in the different chemical characteristics of the water and in particular with respect to the quantities of chlorine measured.

We are confident that the study in question can be completed in the coming weeks and we will be happy to share the results, in hope that they are significant and that they can help the authorities in charge in defining the parameters within which the swimming centres can return to being considered safe places in respect to health.'

Roberto Colletto
Myrtha Pools CEO



We interviewed **Prof. Vincenzo Romano Spica**, Professor of Hygiene at the University of Rome "Foro Italico" *, among the greatest scholars on the safety of swimming pool water and swimming facilities.

* Tenured Professor of Hygiene and Public Health. Graduated with honours at the Faculty of Medicine and Surgery "A Gemelli" at the Università Cattolica, he furthered his studies abroad, in the USA and Europe. He is part of an international network on the study of the safety of swimming pool and spa waters and has collaborated with the WHO regarding water for recreational use. He teaches various Degree and Doctorate courses, and is head of the sports facilities Swimming

Sports and Prevention course at the "Foro Italico" University of Rome where he was Dean Faculty, President of the Master's Degree Courses and is head of the Epidemiology and Biotechnology Laboratory doing his own research on the health and hygiene management of swimming facilities.

Member and former coordinator of the GSMS-SItI National Working Group on Physical Education for Health, in the Society of Hygiene, Preventive Medicine and Public Health. Author of articles, patents, and editor of the recent volume "Hygiene in the Pool", IV Edition, Editore il Campo, 2020.



PROFESSOR, THIS CORONAVIRUS IS INFECTING THE WORLD AND STOPPING DIFFERENT SPORTS ACTIVITIES, INCLUDING THOSE IN THE POOL. CAN SWIMMING POOLS REALLY CONSTITUTE A DANGER?



Although Coronaviruses have been known since the 1950s and 1960s, this new virus called SARS-CoV-2 really has new, unknown and therefore unpredictable characteristics, both through its ability to spread and cause the "Covid-19" disease.

In the 80s-90s I studied Coronaviruses among the various so-called "para-influenza" forms, some of which had been found - albeit rarely - even in swimming pools, such as pharyngoconjunctivitis from swimming pools, caused by an Adenovirus, or other flu-like forms due to other very common, seasonal and widespread microbes in the general population of all ages. Coronaviruses, **like other seasonal viruses and forms called para-influenza**, are very contagious and easily transmissible from person to person **in different environments**, even with-

out frequenting swimming pools! Swimming pools are therefore one of the many areas in which SARS-CoV-2 **can** spread, but they do not stand out as constituting a particular danger, **at least according to current epidemiological data**.

Moreover, the Coronaviruses themselves, until before the SARS of 2003, were fundamentally known not for their seriousness, but rather because they showed some symptoms of the common cold, sometimes with sore throat. They were not that interesting for politicians or the media, and we could not find funds to study them ... it could never have been expected that a Coronavirus would stop the world. The Covid-19 risk in the pool, therefore, is a negligible part of a completely new and much wider risk and must be addressed as such, in managing swimming facilities properly at the time of the Coronavirus.

SO IT'S LIKE A HEAVY FLU THEN?

No, influenza is another disease, caused by a different microbe, which has another name, it is called Orthomyxovirus. However, the two diseases have common aspects, and one can help us understand the other. Even the flu could be transmitted accidentally among the visitors to a swimming pool, but this is an exception compared to what happens in crowded places such as subways, cinemas, offices, schools, gyms, conferences or meetings of different types. Furthermore, influenza also leads to high mortality in the population, albeit often underestimated. Both SARS-CoV-2 and Orthomyxovirus kill on a large scale, that is they manage to infect so many people and in such a short time, that even if the serious and

fatal cases are a minimum percentage, the numbers, however, become very high, **with a significant burden on health systems**. For the flu, however, we have a vaccine and therapies that have been tried and tested for some time, for Covid-19 on the other hand, there are no specific vaccines or antiviral drugs. Both Covid and the flu are pandemics. That is, they are diseases that spread without borders and affect all five continents of this globalised and, after all, increasingly small and fragile world of which we must become aware (as in the words of the old children's song: "...it's time we're aware/It's a small world after all", **listen to it again!** It will help us to reflect, respect it and prevent other pandemics).

IN OTHER WORDS, PROF. ROMANO SPICA, FROM WHAT YOU SAY, DO I UNDERSTAND THAT POOLS SHOULD NOT CONSTITUTE A HIGH DANGER AND THE CORONAVIRUS SHOULD NOT PARTICULARLY SPREAD THROUGH THE POOL?

Of course, swimming pools are only a small part of the many different situations in which the virus can spread from one individual to another. At the moment there is no epidemiological evidence that can demonstrate a particular role of swimming pools in the spread of Covid. Most likely, in fact, if general prevention measures are respected, swimming pools could also be among the safest and most controllable structures.

However, it is necessary to distinguish between the sport-physical activity or rehabilitative use of swimming pools from the play-recreational one, which comes more within the sphere of beaches and fun spaces. In fact, it becomes more difficult to foresee a control over social distancing or compliance with stringent regulations on an open beach or in a pool where elderly and children play freely and without rules. At the time of the new Coronavirus, these situations should wait for a substantial reduction in the epidemic before they can be reopened safely, and in any case always in compliance with shared rules. For sports swimming facilities, on the other hand, clear regulations, preventive measures, technical solutions and user discipline can encourage the achievement of higher levels of safety to counter the possible transmission of Covid-19.



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CAN YOU BE MORE CLEAR, WHAT DO YOU MEAN BY COVID TRANSMISSION IN THE POOL?



This is the fundamental point. First, the virus is transmitted by air, from individual to individual. This could theoretically also happen in the pool between nearby swimmers, or in changing rooms, or in any environment such as a nearby bar or SPA or in spaces for spectators or offices ... from this point of view, the distance between individuals and crowding counts, as in any public place, office or meeting place. However, among the different sports, it is difficult - even before the pandemic - to imagine that a person with Covid-19 symptoms decides to go right into the water. Which mother - even the most irresponsible or **unprepared** about Coronaviruses - would send their child with a cold, cough or fever into the pool? And which coach would let him stay with the other kids? And which Athlete would go to train with a cough and fever, diving into the water at the risk of aggravating their situation and skipping all subsequent workouts? In short, the rules of common sense were usually already widely applied and always among users and operators of swimming pools (perhaps less in the gym or playgrounds), but now they should become aware, increased and even made compulsory. Simple regulations are needed, and adequate training of operators to enforce them. No

regulation works, however, without the collaboration of users, and this is the fundamental point in managing swimming pools safely and to be able to safeguard everyone's health, with the conscious participation of all. I would not exclude taking internal sanctions into consideration, such as fines or withdrawal of the membership card in case of violations (you know, everyone shares the principles "in theory" but here they must be enforced, in the interest of all and that of the swimming facility).

No manager would ever want their swimming pool to become a hotbed of a Covid epidemic. In fact, the adaptation of health and hygiene standards for swimming facilities is not new. The world of swimming pools has an ancient tradition in being prepared for prevention. It is **already** part of the culture of managers, operators and users, as well as designers and maintainers. From this point of view, the world of swimming pools has always been a leader, and for other sports as an example, I do not see why it cannot be so even in this situation when resuming activities after the Covid emergency! Therefore, prohibiting access to the sick and reducing crowding are the fundamental principles, but not the only ones.

SO WATER DID NOT REPRESENT ANOTHER DANGER, IN ITSELF?

Often yes, in the past, but this time no. Legislation and guidelines on swimming pool water have followed one another indicating the risks and updating the parameters, and the reason is that water is a known vehicle for diseases and must be suitably treated. Covid-19 mainly follows another transmission route, which is by air. The pools, if well maintained, are now safe from epidemics carried by water and once feared, such as typhoid, cholera or cryptosporidiosis, and may soon also be from Covid-19.

Unfortunately, Coronavirus can be expelled through saliva, nasal secretions and also through urine, faeces and other biological fluids, traces of which could contaminate the water and reach other swimmers; but at the moment it is only a theory and these were not the transmission methods that explained the rapid spread of Covid-19 in China, in Italy, throughout the



BUT CAN YOU TEST TO SEE IF THE VIRUS IS IN WATER?

In principle, yes, but the search for viruses in swimming pool waters is a complex topic due to technical aspects and I will not enter into it here, (but which are contained in literature or in our recent book on Swimming Pool Hygiene, Editor Il Campo, 2020). Quick and easy tests would be needed. We too have developed and patented a rapid system, to evaluate the presence of traces of biological contaminants in water, air or on surfaces and we have made it available for identifying the Covid risk in the environment (a proposal presented to the recently issued call from civil protection and government as part of a national call for Covid research).

We had already tried the system in various areas, including the water exchanged between sportsmen who drank from the same bottle, demonstrating the contamination of biological fluid - in this case saliva - and therefore the increased risk of pathogens that can be transported with saliva and water. However, the soft bottled water



world. As attention is now required for everyone's social distancing in an office, a school, or in a supermarket queue, or on a bus, greater attention and awareness must also be acquired in sharing water for swimming or performing physical or rehabilitation exercises. However, it is a good thing to clarify that even if we had the water of a very crowded swimming pool, for example for training or a competition, if none of the athletes was sick or a carrier of Sars-Cov-2, that water can never be a danger through Covid-19, neither for the players nor for those who use it later.

This concept is very important to correctly configure safety measures, because it makes it necessary to take into account the local situation and the circulation of the virus in the general population. In this perspective, control over users and their education in swimming pool hygiene become the other fundamental principle for prevention. It is true that water can be a vehicle for various diseases, but the progress of science and compliance with technical, facility and regulatory requirements have made this risk practically negligible and acceptable. Now we have to adapt this knowledge to Coronavirus. It is a team effort between scientists, health authorities, the world of sport and industry. **In fact, a joint effort by industry is also needed to combat Covid-19, in swimming pools as in other places open to the public, through innovative products for the management of water, air and the hygiene of surfaces and environments.** However, as far as we know at the moment about this new and strange virus, the fundamental mode of transmission is air and not water, which among other things must be treated and have an antimicrobial action in the pool, as provided for by the law and by the WHO guidelines.



is not chlorinated nor as "abundant" as that of the swimming pool, in which, however, the possible presence of microbes could be inactivated and, in any case, would be greatly diluted. Arranging environmental tests would be useful for water, but especially for the adjoining spaces, such as changing rooms, which should be cleaned and disinfected properly.

We had already tried this test in a hospital setting, as an additional opportunity to monitor hygiene in light of the higher levels of attention imposed by new pathogens. This or other methods of supervising the sanitation of one's facility would be desirable.

At the moment, however, it is necessary to scrupulously comply with the current indications by the health authorities, both for the sanitation of the pools and for the methods to be adopted to check their effectiveness. In conclusion, it is important to be even more careful not to release biological fluids into the water and ... you can no longer exchange your water bottle at the bottom of the pool!



SORRY PROFESSOR, BUT IF THE POOL WATER IS DISINFECTED WITH CHLORINE OR OTHER PRODUCTS, IS THIS NOT A GUARANTEE?

At another time, I would have said yes, it is a guarantee of safety that the water is disinfected and appropriately treated according to current regulations. Today I have to say "yes, but ...". Yes, because - what you say is right - various disinfectants including chlorine also act on viruses and therefore also on a Coronavirus; but it is also true that this "new" virus is still little known and has already given us unwanted surprises. Therefore, in the absence of epidemiological evidence and dedicated experimental studies, it is necessary to be very cautious.

At the moment, there is no evidence that COVID-19 can be spread to humans through the use of swimming pools; and proper operation, maintenance and disinfection should remove or inactivate the virus causing COVID-19. However, SARS-CoV-2 could be present in saliva or other biological fluids that could contaminate the water even just in traces, protecting the virus with organic material. We therefore have yet to verify the real ability of this virus to survive chlorine, in the different conditions of the water in the pool. In the past, swimming pool epidemics due to various viral and non-viral microbial agents, have been mainly associated with poor management of the water and the hygiene conditions of the sys-

tem. However, it could be that a person particularly capable of expelling microbes into the environment could put a strain on the best run pool (e.g. a carrier of a more virulent form of the virus, or because they are disrespectful of hygiene measures, or as a result of an accidental release of biological fluids). Therefore, chlorination and more generally water disinfection are especially important, such as the optimal implementation of all treatments (e.g. recirculation, replenishment, filtration), but at present they may not be sufficient to guarantee safety in the presence of virus carriers.

However, although the results of specific studies on swimming pools and Covid-19 are not yet available, science can provide some more clues, by borrowing theories from previous research. We know in particular that other human or animal Coronaviruses are sensitive to disinfection also through chlorine-based products, and this bodes well for the control of the new Coronavirus in the pool. Therefore, swimming pool water that meets the optimal requirements of current regulations could probably be considered more protected, but new data and experiments would be welcome in the short term, for tests based on scientific evidence in light of the challenges posed by the new Coronavirus.



AND AIR?

Air is the fundamental vehicle for the transmission of the new Coronavirus. In outdoor pools and outdoor spaces, there is a high dilution and oxygenation factor and, often, the presence of the sun's rays, which with the UV component can contribute in carrying out an antimicrobial action. In these situations social distancing is the main precautionary measure.

On the other hand, in indoor pools -as for any indoor environment- the air exchange must be as optimal as possible and the system for recirculation adequately maintained. Filters and various methods of air treatment exist, but they do not have a residual action over time and on site, so the problem persists, substantially due to the presence of possible carriers among users, visitors or facility operators.

Any measure that favours the exchange of fresh, clean air can contribute to the dilution and expulsion of both micro-organisms and any volatile chemical residues, but must be balanced with costs, for example related to heating or **installing new fittings**. In any case, both in the stands and in the pool,

crowding must be avoided and conditions to favour social distancing must be allowed, according to the WHO indications at least 1m away, minimum, better if greater, at least in the early stages of reopening. The capacity of the environments and pools will therefore have to be rigorously respected, from the spectator stands to the changing rooms, from the routes to the edge of the pool, possibly reducing them further below the threshold value, as a precautionary measure.

The world of swimming pools has always set rules for crowding, now they must be perfected, shared and calmly adopted with the collaboration of users and managers. The effectiveness and appropriateness of these measures, however, will depend on the actual circulation of the virus among the population, and may be adapted over time.

In other words, caution is necessary but absolute zero risk does not exist, so prevention must be proportionate to the real and reasonably acceptable risks in a correct cost / benefit ratio.

SO, UPON REOPENING OF THE ACTIVITIES

AND IN THE NEXT FEW MONTHS OF COHABITATION WITH COVID, SWIMMING POOLS, YES OR SWIMMING POOLS, NO?



Everything will depend on the levels of safety that governments will arrange for the various activities, and therefore also for sports activities and therefore also for swimming facilities. If the possibility of performing swabs **or other**

tests aimed at a certification of the absence of asymptomatic Coronavirus were then established, not everyone should be considered as possibly sick or carriers and a measure of the real risk in that population would be acquired on a local level. After all, do you think it is possible for everyone to remain indoors and stop activities indefinitely?

We can't allow it. Not just for economic or social reasons, but also for health reasons. In fact, let's not forget that before the Covid pandemic (and unfortunately also during and after), one died from other pandemics such as those caused by obe-



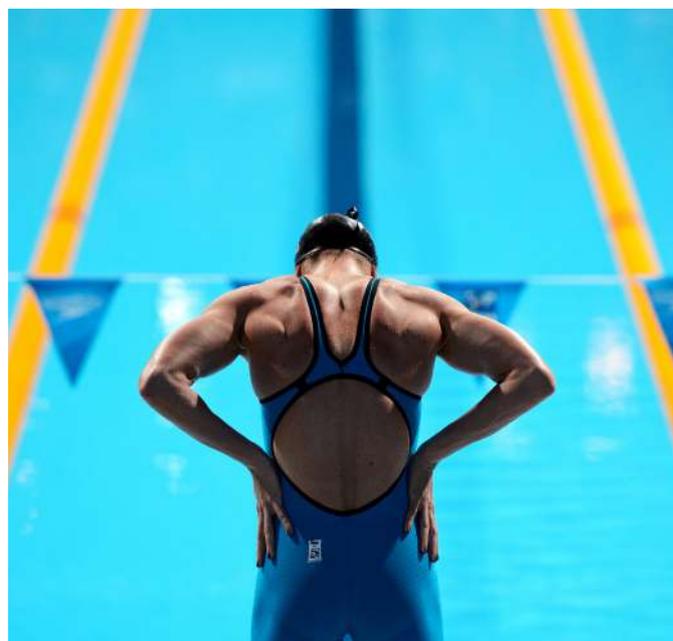
IN CONCLUSION, CAN YOU SUMMARISE FOR US IN A FEW POINTS WHAT YOU THINK IS NEEDED FOR AN OPTIMAL MANAGEMENT OF A SWIMMING POOL, TO MAKE IT EVEN SAFER FROM COVID-19?

1. ensure correct maintenance, **placing the parameters on the maximum permitted levels of safety and quality**. Both for water, but also for air, adjacent surfaces and environments, such as changing rooms.
2. perform a Covid risk assessment in the facility, **and prepare a prevention plan with targeted and individualized measures**, including updating the regulations and training users and staff. Ensure the measures are applied, possibly without excluding forms of internal sanctions for those who seriously violate the safety rules, such as temporary withdrawal of the membership card for access to the facility or temporary suspension from activities. Deny access to individuals in quarantine or with symptoms (fever, cough), or without negative swab certification, if required by regional or national directives, or by specific local situations. Promote the exchange and / or replenishment of water and air.
3. ensure **social distancing**, both in the pool, in the changing rooms and other rooms attached to the swimming pool, avoiding crowding through taking turns and devising methods of accessing the pool or changing rooms. Do not exclude measures on internal staff or athletes, for example also through active surveillance that may also consider the results of negative swabs.

sity, cardiovascular disease or neoplasms. Not infectious but multifactor and chronic-degenerative diseases, all mainly due to the "sedentary" risk factor (albeit together with diet and other conditions such as smoking and alcoholism).

Doing physical activity and also "in the water" constitutes a very important protection factor for the health of populations, regardless of the economic needs of top athletes or the world of amateur sport, which are also fundamental and must be respected with the utmost attention.

So yes, even from an epidemiological and public health perspective, it is necessary to be able to start moving again, to produce and to take part in sports and physical activity, and also and above all to be able to do it safely in the pool. This requires awareness and caution, but this will be the real victory over Covid. **Yes, swimming pools yes.**



4. optimize **environmental sanitation** procedures, particularly in the changing rooms, both through establishing procedures for periodic cleaning and disinfection, and through the activation of control measures on the level of environmental hygiene achieved. Have emergency plans in the event of contamination (e.g. accidental releases of biological fluids), failures or interruptions in the operation of the water or air treatment systems, or violations of internal regulations, both as regards the pool area and the adjoining spaces.
5. follow the **local epidemiological situation** and adapt the measures by updating them based on indications from the health authorities.

COVID-19 PREVENTION MEASURES



1. MANAGEMENT AND MAINTENANCE

WHAT

Adjust the water treatment parameters to the maximum values of the local reference standard, in order to guarantee the highest level of prevention possible.

HOW

E.g. Free active chlorine at the high limit, favour the make-up percentage.

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3. USER DISTANCING

WHAT

Guarantee social distancing. Adapt the general provisions to the specific characteristics of all the rooms or spaces in the swimming pool (in addition to the pools also the changing rooms, the toilets, the access corridors, etc.).

HOW

Taking turns, reservations, staff training, definition of user regulations, checks.

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5. EPIDEMIOLOGICAL SITUATION

WHAT

Constantly monitor the local epidemiological situation and adapt the measures in the previous points accordingly.

HOW

Follow the official updates and respect the guidelines.



2. RISK ASSESSMENT

WHAT

Update the risk assessment document (or create one ad hoc) in reference to the Covid-19 issue. Take tangible and targeted measures, specifying the responsibilities and also indicating the appropriate sanctions to discourage any defaulters.

HOW

Introduce internal controls through specific parameters and limits.

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4. DISINFECTION

WHAT

Optimize environmental sanitation procedures. Also provide specific emergency plans in case of accidental contamination.

HOW

Check sanitization.



WATER. VISION. CREATION.



Prof. Romano Spica also left us some references for further information and updates:

www.who.int/

www.ecdc.eu/

www.cdc.gov/

www.iss.it/

www.sitinaZIONALE.it/