

The Effect of Room Temperature on the Spread of the Covid-19 Virus by Creating a Special Isolation Room with a Hot Temperature for Those Indicated as Medical Service Facilities

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ABSTRACT

During the Covid-19 pandemic, there were many alternatives to anticipate or anticipate through certain tools and media with less effectiveness and endanger the users, for example, a device that can be called a disinfecting chamber or "disinfection chamber. Alcohol and chlorine can be used on the surface of the body with instructions or user guides. With an official statement from the world health organization directly that it can endanger health, there must be a breakthrough in new media that is safer for users. Corona virus is exposed to high temperatures it can reduce the life span of the virus itself or can kill the virus itself at 92 degrees Celsius within 15 minutes. Giving heat to the room itself using heating by providing steam as in the sauna room and the interior elements are also applied special heat-resistant materials without compromising the safety and health of the users of the room. Then this room will be in health centers that move to handle patients who are examined and also useful for medical practitioners who treat patients. With a room that has a high temperature is expected to minimize the spread of the virus on an ongoing basis and neutralized our bodies outside of the virus in a safe way, because reported by various news, the specialists in internal medicine provide a statement that the virus that is outside the host or can be called a part of our body can last within 3 hours without handling such as washing hands using a handsanitizer or other treatments. The output of the research itself is a room with a hot temperature with wood material and the shape of the room adapts to the needs and existing literature. Then the benefits of this research can be realized a tool to inhibit the spread of the Covid-19 virus and can be used as much as possible for health workers and people who need it.

Keywords: covid-19, disinfection chamber, isolation room

INTRODUCTION

Today, in Indonesia itself, cases of the spread of Covid-19 continue to increase very significantly so that various places with high activity such as work spaces or other places experience changes in social, health and other ways. From these changes, new habits or protocols are formed that are recommended by the government to reduce the spread and provide health services with certain media, the protocol itself is not only in the health sector but also in the social field in such a way that we can call it physical distancing or social distancing. Then media such as drugs or vaccines that can fight viruses in our bodies have not been found until now, the world has been urged to find vaccines so that the virus does not worsen the atmosphere and world activities return to normal.

Then there is the so-called disinfectant booth which was popularized by the Mayor of Surabaya, namely Mrs. Tri Rismaharani which was made by the Telkom Surabaya Institute of Technology, there are 2 types that were handed over to the City Government, namely the Chamber and Tunnel types. The Mayor of Surabaya himself believes that the breakthrough technology he made is more perfect than just washing hands because the media sprays disinfectant on all body surfaces so that our bodies are protected from viruses and germs, (Source from Kompas.com). With this breakthrough, many criticize that the tool is not safe for health. In circular letter NUMBER: HK.02.02/111/375/2020 concerning the use of disinfection booths in the context of preventing the spread of Covid-19 from the Ministry of Health of the Republic of Indonesia, the Head of the Expert Team for the Task Force for Handling the Acceleration of Covid-19, Wiku Adisasmito also confirmed the contents of the circular. that "Disinfectant liquid is only allowed for objects or goods, so it is not recommended to be sprayed on the human body," said Wiku during a press conference via online media at Graha BNPB, Jakarta, Sunday (5/4/2020). Even the World Health Organization (WHO) does not recommend the use of a disinfectant booth because it is not included in the health guidelines and endangers users, it indicates that this tool is clearly in doubt about its safety for health.

Then the medical discovery that the virus would die if exposed to a fairly high temperature for a certain period of time became the focus of research to be carried out by developing a hot room with steam to neutralize the body's surface from the Covid-19 virus. This room can be an alternative to the disinfectant booth, but it will be refocused on a health center which is full of activities for handling patients exposed to the virus and isolated patients. The design of this room is inspired by the sauna room which is located in beauty and relaxation centers, even basic things such as the design are in accordance with the concept and purpose of making the object of research, in terms of material using fibrous wood and absorbing heat, firm shape, natural color, heater. the room uses infrared, which differs only from a technical point of view of seating because there are health procedures applied.



Figure 1. Sauna room interior.
Source: <https://id.wikipedia.org/wiki/Sauna>

Sauna

Sauna is a small room that is heated to a temperature of 65°C-90°C. Modern saunas usually have interiors of unpainted wood. Saunas are also often equipped with rocks as heating elements because they can absorb and release heat well. Water can be poured on this rock to create steam (hot steam). Relaxing in a sauna, especially after exercising is very comfortable, and can relieve aches and pains. But using a sauna there must also be knowledge and knowledge so that all these benefits do not turn into something that can harm health.

Facts About Sauna

The word sauna comes from the Finnish language which means relaxing (relax), so Finland is said to be the country where sauna originated. At first it was a hole in the ground covered with animal skins and then hot steam flowed through it. In Finland, the sauna is used as a place to socialize. There are several types of saunas, with various characteristics and methods of heating. Not everyone can take advantage of the sauna related to their health conditions.

Types of Sauna and How They Work

There are several types of saunas, some still adhere to traditional principles such as a dry Finnish Sauna and a combination with a cold pool for soaking after finishing the sauna. Turkish-style Sauna (Turkish Sauna) is also famous for using steam so it is more humid, similar to a steam room (steam room). Often called Turkish bathhouses (bath houses) or steam rooms. There are several methods of how a sauna system generates heat: (1) Steam, the type applied to the Turkish-style which uses steam from boiling water to heat a room by providing high humidity; (2) Wood, it is a traditional method that uses a wood-fired stove to heat the stone. The hot stone then spreads its heat throughout the room. It is a dry sauna with low humidity. Water is then poured every 10 minutes on the hot stone to add moisture and heat the room even more. (3) Electric heater, is the type that is most widely used, because it is safer and easier to use. Often found in health clubs and gym/fitness. Just like the type using a wood stove, electric heaters are used to heat stones. This sauna is also dry type with low humidity; (4) Infrared lamps, it is classified as a modern sauna that uses infrared (IR) lights. This IR lamp produces electromagnetic wave radiation which is directly directed at the body to heat the body, so that only the body feels hot, while the room is not so hot, in the range of 60°C only.

Benefit of Sauna

Sauna is a method of therapy that has long been used with the following benefits: (1) Sweat that comes out while in the sauna, is useful for those who have COPD or bronchitis, congestive heart failure, and peripheral arterial disease; (2) Sauna also helps to reduce complaints of *rheumatoid arthritis* (rheumatic arthritis); (3) Useful for muscle selection after exercise. Because it can reduce inflammation and muscle pain. Especially saunas that use infrared heating; (4) Can improve heart function for people with heart failure, but a maximum of only 5 minutes per session; (5) Reduce the risk of stroke. This was studied several years on more than 1,600 Finns who use the sauna 4-7 times per week; (6) Reduce the risk of dementia or *senile dementia* and Alzheimer's disease. Researched on 2,315 Finns. (7) For those who like it, it can calm the soul, so it is often used to treat depression and other psychiatric problems.

Using the Right Sauna the Benefits of Sauna Can Only be Obtained When Used Correctly

Here are some notes to keep in mind: (1) When using a sauna in a public place, rinse your body first, to remove odors and germs that may be attached to your skin; (2) If this is your first time using a sauna, it should be started gradually, only 5 minutes per session; (3) If you are in the sauna after exercise, wait at least 10 minutes before entering the sauna room; (4) Sauna is only healthy when used for a maximum of 15 minutes for each session. It is published in the American Journal of Public Health. The longer you stay in the sauna, the higher your risk of getting dehydrated; (5) Therefore, before and after using the sauna, you must drink at least 1 glass, as well as if you want to repeat for the next session; (6) Start with a dry sauna first for 5 minutes, then add steam (hot steam); (7) Do not eat large amounts before going to the sauna; (8) Do not drink alcohol before, during and after using the sauna; (9) Don't fall asleep in the sauna; (10) Once out, rinse immediately, and preferably with warm water.

Conditions Forbidden to Use Sauna

Sauna is not for everyone, so it is necessary to pay attention to things such as the following: (1) It is very important not to use the sauna, if you are sick. When in doubt, ask your doctor first; (2) Women who are pregnant or planning to become pregnant, should also consult their doctor before using the sauna; (3) Those with certain health conditions such as having high blood pressure, diabetes, heart

failure, arrhythmias, and angina pectoris should limit the use of the sauna to only 5 minutes, and should not rush to cool down again; (4) Sauna should not be used when using drugs that have an effect on body temperature regulation, such as fever-reducing drugs; (5) Get out of the sauna immediately if you feel hot, unwell, dizzy, or if your heart is beating fast. Don't push yourself, your body is trying to tell you, the sauna is over its limit; (6) Finnish sauna combined with soaking in cold water after sauna. Not suitable for women who are pregnant or people who are sick, because for them body temperature must be lowered slowly; (7) For men who are on a fertility program, should avoid saunas because they suppress the number of sperm production.

METHODS

This research is an analysis of the phenomenon of alternative media for the prevention of the Covid-19 virus by making special isolation rooms with hot temperatures for health care facilities. The data collection method uses qualitative methods by using design simulations in translating the results of the research issuers and data from various sources to maximize the overall design of the isolation room. That way, applying existing data to the object to be created is an advanced stage. Then the creation of this isolation room is expected to be a solution for the public to suppress the spread of Covid-19 with a special method, namely heating the body so that the virus dies by itself so that it is free from viruses that stick to the outside of the body.

RESULTS

Issue Discussion

Relying on the facts about the dangers of a disinfection chamber, reinforces that there is a need for a safer alternative for the health of its users. Then the hot temperature becomes a guideline for the media to be made and developed for improvement if it passes clinical trials and can be used as a tool health services. The essence of this research is to analyze how effectively hot temperatures can shorten the lifespan of the virus on the surface of the human body, so the discussion on this issue is interesting to study more deeply on medical references.

Facts about the virus itself, the virus can not live long if not on the host (human body, animals) because the virus requires a medium to live longer. In addition, there are also interesting facts from scientists from the university of Aix-Marseille in France, In the study, African green monkey kidney cells were infected with the virus. The researchers then created two different sets of conditions, "clean" representing the laboratory conditions, and "dirty," which would be more like the conditions a real-life sample was taken. Two other heat conditions, 60 degrees Celsius for 60 minutes and 56 degrees Celsius for 30 minutes, resulted in a 'clear reduction in infectivity', but with some samples with higher viral loads remaining active. Some strains of Sars-CoV-2, the virus that causes COVID-19, can survive temperatures of 60 degrees Celsius for an hour. To kill the virus in a laboratory setting, the team had to heat it to 92 degrees Celsius for 15 minutes, (Quoted from Detikhealt.com). From the news above, there is also the possibility that hot temperatures will be able to kill or shorten the life of the virus, and if we combine the above data with the manufacture of alternative media, special isolation rooms with hot temperatures such as sauna rooms are certainly related to be realized. So the conclusion from the discussion about the effectiveness of hot temperatures in killing viruses can be possible with medical terms and conditions as well as adjustments to users. Then further discussion of the design of this isolation room will have the theme "the power of the medicals" with the concept of "fight, we can!", the theme and concept is dedicated to medical warriors in handling the Covid-19 virus, more appreciation is needed for them. who are desperately fighting at the forefront to fight this pandemic.

Design Discussion

The criteria for making this isolation room in terms of design literature are as follows.

Magnitude of Space

The size of the room depends on how many users can enter and the effectiveness of the room by accommodating how many people and then not forgetting the rules or health protocols during a pandemic, if you have to do physical distention, it will affect the placement of the seats.

Table 1. Sauna room capacity according to area.

No.	Room	Capacity
1.	1.5 x 1.5 x 2.1 cm	(1 - 2 people)
2.	2.5 x 2.5 x 2.1 cm	(1 - 4 people)
3.	3 x 3 x 2.1 cm	(1 - 6 people)
4.	4 x 4 x 2.1 cm	(1 - 8 people)

Source: <https://www.pabriksauna.com/size-ruang-sauna.htm>

From the discussion about the area of the room above, we can analyze, if we minimize the room to size number 1 which has a capacity of 1-2 people, it can be applied but it can't be maximized from other things such as the length of time used by users while this room is intended not only for patients but also for paramedics, medical professionals such as doctors, nurses and others who work to treat patients. Then, if it is maximized to size number 4, there will be too many people in it. The health protocol is not recommended because the health protocol system itself recommends that we do physical distancing and if there are too many users in it, the air quality is not good. So ideally the selection of the area of the room itself is at numbers 2 and 3, in addition to air quality also physical distancing provides a distance for users by placing a cross on the seat to the seat which is about 1 meter apart, then if the area is 9 m² it can accommodate 1-6 people will be reduced to 3-4 people in the room. Conditions also affect the ideal area, if the situation is crowded or there are queues for use, the solution is to enter several people into the room at once to shorten the queue.

Material

In high-temperature rooms such as saunas and others, usually the interior elements are safe materials for users, one example is the use of materials that can absorb excess heat, for example the seat occupied in the room will be hot if the material from the chair does not absorb heat and instead reflects heat. With the selection of the right materials will provide user comfort in the room. Then here are the right materials with the above criteria.

Radiata Pine

Growing Area: Australia (740 thousand hectares), Chile (about 1.3 million hectares), New Zealand (1.2 million hectares), South Africa and America. The largest known forest for this timber is from Chile. Some exporters also come from New Zealand but are not purely plantation. Usually New Zealand exports this wood already in S2S or S4S form.

Tree: Between 15 -25 years, Pine Radiata wood can have a trunk diameter of 30 -80 cm and a height of between 15 -30 meters. Pinus Radiata is a type of tree that grows fast and has straight trunks.

Wood Color: The heartwood is brownish red and the sapwood is yellow and cream. Line The circle of the pine radiata is quite clearly visible so that the wood grain lines on the tangential division can be seen clearly as well.

Density: 480 -520 kg/m³ at 12% MC.

Wood grain: Tends to be straight but there are many knots because the radiata pine tree has many small branches on its trunk.

Drying: about 12-15 days to get 12% MC level.

Machining process: Easy to work with, including soft for the knife.

Application to the room: wood is used for all interior elements from the floor, ceiling and walls. Then the use of this wood is also used for the stove and the seat.



Figure 2. Radiata pine wood.
Source: <https://housingstate.id>

Tempered Glass

Tempered glass is glass that is widely used for doors, facades, house canopies. From its use, we already know that this glass is quite strong and durable, here are the advantages of tempered glass: safer, stronger, heat resistant, anti-scratch and damage, and high quality.

Application to the interior: The use of tempered glass will be at the entrance to the room with the addition of stainless steel on the door handle

Heating Equipment

The room heater itself uses a more modern tool because it transfers heat quickly enough to the room. Electric and infrared heaters are 2 appliance options that can provide quick heat. Several studies have looked at other benefits of using both electric heating and infrared saunas in the treatment of chronic health problems, such as high blood pressure, congestive heart failure, dementia and Alzheimer's disease, headaches, type 2 diabetes and rheumatoid arthritis. On the other hand, no side effects were reported with infrared saunas or electric heating saunas.

Detailed Description of the Isolation Room

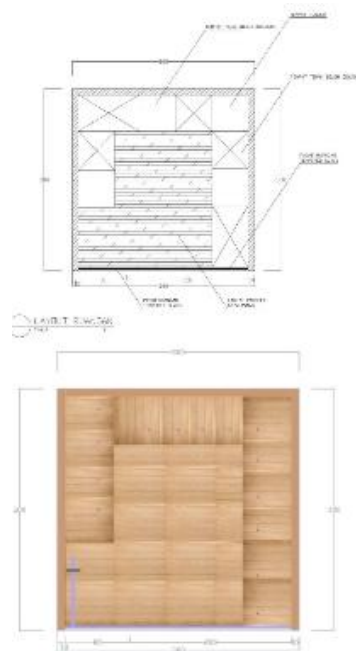


Figure 3. Isolation room layout.

Design Simulation

The following is a design simulation based on data and various considerations that have met the design criteria in accordance with the recommendations of the applicable health protocol standards.



Figure 4. Perspective simulation design.

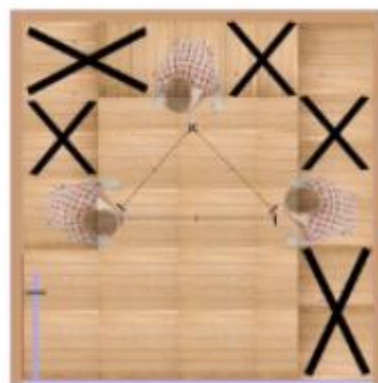


Figure 5. Layout setting simulation.

CONCLUSION

Making alternative media that relies on the circulating issue that extreme hot temperatures can be used as a medical service because there is a possibility that it can kill viruses that are on the outer surface of our bodies, according to research by experts, a temperature of 92 degrees Celsius in 15 minutes can kill the virus. inactivate viral cells. Even in accordance with health guidelines, in a room with high heat, we are recommended 15 minutes, but sometimes users can adjust if their body resistance can't be more than 10 minutes. A room with the exact same temperature as a sauna can indeed provide benefits. Like a double-edged sword, benefits can only be obtained when done in the right way and not excessive; because it can cause problems and health problems and damage to the body. With this research, it is hoped that it can contribute a little to a situation that is very troubling to the public, if it can also be a bright spot for a solution to ease the ongoing pandemic. As time goes by, there are certainly many tools or neutralizing COVID-19 that appear in various forms, therefore this research will continue in the future to be able to improve the effectiveness of issues or research from medical and experts.

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