

EDITORIAL

Omicron, Sarco pod, controversial topics, transplants and new technologies.

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Omicron variant

Before I start discussing the other title subjects, just a brief update on COVID-19.

Coronavirus infection rates in Poland are once again high and the country has now over 100,000 persons dead since the start of the pandemic. Unfortunately, there are still regions in the country, where only a small percentage of the population was vaccinated (with 2+1 booster shot). Even less children 5-11 have been vaccinated. Probably the only thing that will convince unvaccinated persons to get vaccinated is when persons in their families and households start dying from COVID-19.

After Delta, Omicron has become a hot topic. And we can expect more variants in the future. I strongly recommend the Sanford Guide COVID-19 website to be found on: <https://webedition.sanfordguide.com/en/sanford-guide-online/disease-clinical-condition/coronavirus> with the Polish version available on:

<http://www.sanfordguide.pl/covid19/> [1]

The readers will find all the important pandemic updates, including the vaccines. Also, there were new drugs added to the COVID-19 treatment regimens, namely: Molnupiravir and Paxlovid [1].

Sarco pod

There are two medical doctors that were called "Dr. Death":

- Dr Jack Kevorkian (best known), and
- Dr Philip Nitschke (less known).

Jack Kevorkian is probably the most well known doctor to have assisted patients in dying. Born in 1928 as Murad Jacob Kevorkian, a child of Armenian immigrants, he graduated from the medical school in Ann Arbor, USA in 1952 to become a pathologist. Some of the first controversies came when Dr Kevorkian wrote about possible organ donation and medical experimentation on prisoners condemned to death, in place of standard death penalty. While working at Pontiac General Hospital, he performed successful blood transfusions from the recently deceased patients to living hospital staff members. He then started publishing and working on death counselling and euthanasia and is nowadays best known for constructing a euthanasia device and performing assisted suicides. The device was called Thanatron (death machine) and relied on the individual pushing a button which released drugs or chemicals that would end his or her own life. Another device which Dr Kevorkian used was called the Mercitron (mercy machine) which employed a gas mask and a small tank of



carbon monoxide. The first assisted suicide took place in 1990. He lost his medical license in the aftermath in 1991. According to Kevorkian himself, from 1990-1998 he assisted in the death of 130 patients. In 1999 he was convicted of second-degree murder and served 8 years of a 10-to-25-year prison sentence. He was released on parole in 2007 and died in 2011. Before his death, he attended the premiere of the 2010 HBO biographic film starring Al Pacino entitled: *You Don't Know Jack*. His actions heated up the debate around euthanasia [2].

Philip Nitschke was born in 1947 in Australia. After completing a PhD in physics in 1972, he went up north and got involved in Aboriginal land rights activism and then worked as a park and wildlife ranger. After an accident, Dr Nitschke went to study at the Sydney University Medical School which he completed in 1988. In 1996, Philip Nitschke was the first doctor in the world who administered a voluntary, legal lethal injection under the Australian Rights of the Terminally Ill Act 1995, which was overturned in 1997 by the Australian Parliament. Nitschke founded the Voluntary Euthanasia Research Foundation now known as Exit International in the same year. By then, 4 of Philip Nitschke's terminally ill patients used the law to end their suffering. In 2014, Philip Nitschke's medical registration was suspended by the Australian Medical Board. In 2015, the Supreme Court found the decision on suspension to be unlawful and restored Dr Nitschke's registration as a medical practitioner in Australia. The same year Dr Nitschke appeared on BBC's Hard

Talk on suicide as a human right. In the same year Dr Nitschke burned his Australian medical registration certificate. In 2016 he left Australia and moved to Europe. He now resides in the Netherlands [3].

Dr Nitschke invented the euthanasia device in 2008. It's a plastic suicide bag connected to a canister of nitrogen by a plastic tube. The principle behind the device is O₂ deprivation that leads to hypoxia, asphyxia and death [4]. But deprivation of O₂ in the presence of CO₂ generates panic and unpleasant feeling of suffocation (i.e. hypercapnia alarm response), while presence of a gas, like nitrogen or helium, does not. Suicides using this method may be found in the literature. It is unknown, though, how many times such methods were used to fake suicide by government or other agencies. Being virtually untraceable, such methods may be favoured in contracted homicides, as above, especially since they leave no marks, e.g. no visible injection sites, as in insulin overdose, and further, some gases may be undetectable at autopsy. According to professors Copeland, Pappas and Parr, time to loss of consciousness in a bag filled with nitrogen is 15 seconds [4].

In 2012, Dr Nitschke's company was approached for technology to help a man suffering from Locked-in Syndrome – which is complete paralysis of all voluntary muscles except for the ones controlling eye movements. In 2017, Dr Nitschke invented the 3D-printed capsule, which was named "Sarco" - abbreviated form of sarcophagus (Figure 1 and 2) [4].



Figure 1. The very futuristic, spaceship-like pod reminds one of travel to different dimensions. The 3D printed Sarco can be moved to any panoramic location and make the final journey peaceful by a rapid decrease in oxygen level, while maintaining a low CO₂ level, according to its designer [5]. Photo from <https://www.exitinternational.net/sarco/>



Figure 2. Sarco may be a 2in1 set. While printed from biodegradable wood amalgam the top may be detachable and serve as a futuristic coffin, reminding one of Alien series capsules. Photo from <https://www.exitinternational.net/sarco/>



The Sarco will contain a touchpad with nitrogen connected, and once an activation code was entered, it would ask again if the person wished to die. Confirmation would result in nitrogen flow into the capsule which would displace oxygen and cause death [4].

Citing the information on the Sarco pod from the official Exit International website:

"The concept of a capsule that could produce a rapid decrease in oxygen level, while maintaining a low CO₂ level, (the conditions for a peaceful, even euphoric death) was the brief behind the Sarco." [5]

"The Sarco is a 3D-printed euthanasia capsule that allows for a peaceful and reliable death using liquid nitrogen. It has featured in a number of significant installations over recent years...It is expected that Sarco 2.0 will be used for a peaceful death in Switzerland in late 2021/22, all things with the pandemic pending. More information about these installations is at www.sarco.design" [6]

Medical circles as well as the general public are very much divided on the topic of voluntary euthanasia or physician assisted suicide. The phrases raise as much concern as other medical and health issues, i.e. cloning, genetically modified organisms (GMO). The scepticism arises from the possibility of many mental/capacity disorders of patients as well as improved pain control methods. But it's only a matter of time until this heated debate lands on the table again.

Top controversial topics in medicine

Edison and nanotainers

Elizabeth Holmes, a deep-voiced young lady, became the youngest self-made billionaire in the world in life-sciences. She was behind Theranos (founded in 2003), a company that claimed to have developed devices called "Edison" to automate and miniaturize blood tests using microscopic blood volumes, collected into "nanotainers". Like most one-drop diagnostic blood tests, the method turned out to be a scam that promised to make blood-testing easier, cheaper and less painful. An article in The Wall Street Journal in 2015 exposed everything to be false. The micro-samples were inaccurate and totally unreliable. From a staggering worth of \$10 billion, the company was dissolved and liquidated in 2018 and Elizabeth convicted of wire fraud and conspiracy, currently on bail awaiting sentencing [7].

Synthetic trachea

Paolo Macchiarini, was the surgeon who implanted synthetic tracheas coated with stem cells while working at the Karolinska Institute in Sweden and then in Russia. He received a lot of media attention and became a celebrity medical doctor and an international superstar for supposedly turning the dream of regenerative medicine into a reality. Unfortunately his work failed, 7 of the 8 patients with implants died and the artificial trachea did not work. Macchiarini was convicted of clinical misconduct and research fraud and is nowadays best known for fraud and manipulative behaviour.



Rely tampons

These were Procter & Gamble superabsorbent tampons which promised peace of mind to menstruating women. Unfortunately bacteria also had special affinity for the fibers and the resultant toxin production resulted in the deadly toxic shock syndrome. The tampons were swiftly removed from the market. All happened back in 1978-1980 [8].

Spray-on condom - the Sprühkondom

This is not a joke. The spray-on condom was invented by Jan Vinzenz Krause of the Institute for Condom Consultancy in 2006. It was based on placing the erect penis in a chamber where nozzles would apply a coat of fast-drying latex (around 1 min.). The device could be problematic in preserving arousal and erection. The idea was followed by a spray-on deodorant-like condom. But in my opinion it's the equivalent of improving the robust AK-47. Whatever one would do to improve it - the original still works best. There are so many shapes, sizes and materials the modern condoms are made of, that improving them seems useless [9].

Transplants in the 23rd century

"Imagine how fascinated Mark was when he saw the 3D printed heart. It was in front of him, ready to be placed in his body. He reached out, touching the warm tank. It was just like looking at spare car parts, albeit more complex. At that moment he thought that not everything was lost..." – this could be a sci-fi film but also a reality in the centuries to come.

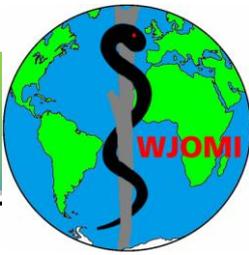
I remember watching films back in the 1980's that showed holographic images, portable phones and flat TVs. At that time our science teacher told us that it's impossible for such items to exist and that it was pure science-fiction. Well, the science teacher is no longer with us, but I did not think I would see these technologies for myself, and available to the public during my lifetime. And here we are - the era of smart phones, holographic images and ultrathin LED TV sets.

What about transplants of the future? There will no longer be the need for donors, complicated family and legal procedures, the limited time for organ transportation etc. Organ printing, a new form of 3D bioprint, will give rise to a new chapter in transplantology. The tissues will be 100% compatible with the recipient, no rejections possible, no need for lifetime immunosuppressive therapy. Hard to imagine, but there are already ongoing studies on the vessels, heart and pancreas, which in the future could help in many heart conditions and cure diabetes [10].

Novel technologies

Medical film training and live procedures

Mistyping wjomi.com, our journal's official website, I came across jomi.com [11]. This turned out to be a website featuring surgical films for attendings, residents and medical students and subscribed by many prestigious medical schools including Harvard Medical School, Johns Hopkins University, Yale School of Medicine etc. Highly recommended if one wants to jump directly into the operating



1. Introduction
2. Incision and Access to Abdominal Cavity
3. Abdominal Exploration
4. Small Bowel Repair
5. Lesser Sac Examination
6. Right Colon Mobilization and Examination of Ureter
7. Partial Cecectomy to Repair Colonic Defect
8. Summary and Final Exploration
9. Closure

2 Incision and Access to Abdominal Cavity

Exploratory Laparotomy in a Hemodynamically Stable Patient for an Abdominal Gunshot Wound

Ashley Suah, MD; Brian Williams, MD
UChicago Medicine

Tags: General Surgery Trauma and Acute Care Surgery

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Figure 3. Trauma surgery of an abdominal gunshot wound (visible on the bottom right). Still shot from jomi.com

1. Introduction
2. Patient Positioning
3. Surgical Approach
4. Patellar Bone Preparation
5. Bone Array Placement
6. Patellar Cementing
7. Robot Landmark Calibration
8. Osteophyte Removal
9. Intraoperative Ligament and Gap Balancing
10. Femoral Robotic Osteotomy
11. Tibial Robotic Osteotomy
12. Implant Trials & Corrections
13. Final Implant Placement & Check Positioning
14. Closure

10 Robotic Femoral Osteotomy
b Distal Resection

Mako Robotic Arm Assisted Total Knee Arthroplasty

Jeffrey S. Zarin, MD, Gustavo Barraqueta, MD
Tufts Medical Center

Tags: Orthopaedics

10629 views

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Figure 4. Novel Mako robot-assisted orthopaedic knee joint exchange procedure. Still shot from jomi.com



theatre without putting on surgical gowns (Figures 3-4). The films show narrated surgeries ranging from general through OB/GYN and orthopedic surgery as well as trauma and non-trauma procedures. Highly recommended novel approach to teaching surgery.

Nanomedicine

Some hope for new vaccines and anti-allergic applications with "novel oil-in-water nanoemulsion (NE) adjuvant to enable intranasal vaccines for challenging diseases and intranasal immunotherapy (INIT) for food allergies", e.g. peanut allergy, all developed by BlueWillow Biologics [12].

Robot-assisted surgery to transform orthopaedics

There are at least 7 different orthopaedic robots available:

1. Stryker: Mako - total hip replacement tool since 2015 and a total knee arthroplasty since 2017 (Figure 4).
2. Medtronic: Mazor X Stealth robot-assisted spine surgery platform.
3. Johnson & Johnson's DePuy Synthes: Velys table-mounted ortho surgery robot with an efficient design capable of integrating into any operating room and helps execute accurate bony cuts.
4. Zimmer Biomet: Rosa robot-assisted knee surgery with 2D X-ray and 3D pre-operative planning tools, allowing surgeons to conduct virtual procedures ahead of the actual surgeries and real-time intraoperative data.

5. Smith+Nephew: Cori for total and unicompartmental knee arthroplasty.
6. Globus Medical: ExcelsiusGPS for robotic spine surgery.
7. NuVasive: Pulse FDA cleared integrated navigation platform as a spinal surgical automation platform.

Conclusions

To sum up, health sciences always had it's up and downs. It's not only the success stories that make headlines but major, spectacular failures are even more popular, despite the fact that companies often want to hide these downfalls from the public eye.

There is so much going on in medicine nowadays, that even experts are often lost and can't keep track. Anyway, anyhow, I always wonder how medicine will look like, say, 500 years from now...

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