PEDISCAN

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Message from the editor

Dear Bengaluru IAPians,

It's Corona Corona Corona everywhere and all of us are locked up at home and many are serving the needy at various capacities from COVID to non-COVID duties. Team Pediscan thanks all the Corona warriors who are serving the country at this hour of need risking their lives

As the IAP BPS motto says, "WE ARE LOCKED DOWN BUT NOT KNOCKED DOWN," we are seeing plenty of webinars from central IAP as well as BPS covering all the possible topics from corona to non-corona to keep us updated as we have plenty of time at hand and those who miss the live sessions can access it later through the IAP website which is a wonderful initiative.

IAP has also come out with telemedicine guidelines and a platform to keep us and the community safe during this pandemic

Hope things would be much better with phased relaxation of the lockdown by the end of next month.

Let us join hands and fight corona!

Keep yourselves safe.

Dr Chidananda N K
Editor- Pediscan 2020

Cyber Stealth

Dr. Sushma V

The Advanced Research Center at Darjeeling was suddenly world famous. This fame was due to the discovery of 'plasti-phage' – the bacteriophage, a tiny microbe, which could literally eat away plastic. Dr. Murthy, who had pioneered the research, and created the phage, was a man with a golden heart. He had decided to present his research and give away vials with millions of phage RNA free of cost. With tons of plastic, all over the world, polluting land and sea, he felt, this was his way of paying tribute to nature. He had no intentions of selling it or make money out of it. He was a simple man, with limited needs and contented with his monthly salary.

The Director of the Institute, Dr. Swarna, was very wary of competitors, who may steal the sample of the phages and sell it on the sly to the highest bidder. She discussed with Dr. Murthy and kept the vials in a safe vault, with strictly monitored access control. Finger print authentication at three consecutive doors was created. This way, nobody could enter the vault.

As the news of the discovery spread, people from varied organizations visited the Institute. Businessmen, industrialists, environmental engineers, waste disposal experts, microbiologists and even the government bureaucrats were given demos of the plasmid eating away tons of plastic in a couple of hours.

Dr. Murthy was also being short listed for this year's Nobel prize. Many people came to meet him everyday. Mr. Tom Jones was one of them. He was a research fellow at Australia. He had brought glorious letters of reference from a premier Institute of Melbourne, Australia. He requested Dr. Murthy to let him stay for a couple of months as an observer. Dr. Murthy was impressed by the earnest young man and agreed.

Slowly, Tom got used to the work atmosphere and routines. He was a sincere worker, hardworking, and an expert with computers. He was quick witted and made friends easily. He had two pets from Melbourne, a terrier and a koala bear. He brought them to work sometimes to entertain his colleagues. The koala bear was a cute and cuddly little one, always trying to get on peoples' shoulders.

Soon it was Diwali time. The Institute was closed for a week-long vacation. All the scientists and staff look forward to this time, and book their holidays well in advance. Dr. Murthy's family was all set to travel to their hometown, near Bangalore, for the festival of lights. He invited Tom to join him for the holiday. Tom was equally excited to participate in the traditional festivities. He couldn't manage flight tickets on such a short notice. But, luckily, he could manage to get tickets for a flight one day later.

The last person to leave the Institute, and handover all the keys to the Security was the Director. She was, by nature, a skeptical lady, who trusted no one. She was very worried and anxious about the safety of the Plastiphages. She doubled the security personnel and also got additional CCTV cameras installed. Tom created software links for her, so that she could get real-time access to the CCTV feed. Relieved by all security measures, she left to her home in Maharashtra.

Diwali is a huge festival all over India. Lamps are lit, homes decorated, and crackers are burst. Dr. Murthy's family home in Bangalore was a huge bungalow. Everyone had a wonderful time. Tom was astonished to see the wide variety of dishes prepared everyday. He enjoyed every bit of his vacation.

A week's holiday just flew past and it was time to get back to work. The Institute at Darjeeling was again teeming with people returning back. There was laughter everywhere and stories being exchanged.

Dr. Murthy got back to his lab on Monday, with a fresh idea, to try if his plastiphage would work on thermocol too. He rushed in to the safe vault, and was shocked to see all the 10 vials of the plastiphage missing. He shouted for help and almost collapsed. His students who heard him, tried to get in, but could not open the door. Suddenly they remembered that only two people had access into the room and called Dr. Swarna, the Director. She almost ran to the vault room and entered in, to find Dr. Murthy in tears. He just kept saying, 'It's all over now". She gently led him out and gave him some water. After sometime, Dr. Murthy was more calm and composed. He explained that the plastiphage vials are missing from the vault. Now it was Dr. Swarna's turn to be shocked and bewildered.

"How can they go missing? Inspite of all the security" was the top question on her mind. She immediately summoned the Police Chief, Mr. Ming Ma. He was briefed about the theft and the immeasurable value of the vials. This required urgent and effective action, with utmost secrecy. Nobody wanted the news of the theft to be leaked to the other staff or the media. The police chief knew that he had only one person whom he could trust to solve this mystery. He summoned his favorite detective Mr. Sanjith, and handed over the case. He was given just 24 hours to find the culprit and get back the vials.

Sanjith was a smart investigator with a charming personality. He was specially trained in forensic science and cyber crime. His best asset was his common sense and ability to think out-of-the box. He immediately started his work at Dr.Murthy's lab, in the guise of a student intern. He spent time researching the importance and magnitude of the plastiphage discovery. He spoke to everyone, carefully jotting down the details. He interviewed Dr. Swarna and took all details of CCTV cameras and finger print access doors.

The CCTV footages were recorded on a 10 Tb memory card. As the recording was on high resolution, within a span of 72 hours, the card would be full. Unless the video was downloaded, newer recordings would overwrite the existing one. Sanjith could get just the

video recording of the last 72 hours, which showed nothing amiss and nobody near the entry of the vault. He realised that the crime would have happened before that. He then started interrogating all the staff about their whereabouts from the start of the vacation to the next four days. He made detailed notes and sent his team to cross check each person's flight/train tickets and other details.

The details matched and nobody seemed to have lied. Yet, the vials were stolen from a super secure vault. By now it was almost 10pm and everyone had left. Sanjith finally took a break for dinner and a cup of tea. As he sat on the lawn, staring at the stars, he realised that the crux of the issue was breaking into the access controlled vault. He started checking on the computer database and tracked the software. After some thorough checks, he found a deleted access file. He found that a set of fingerprints were given access to the vault, and programmed to get auto-deleted in 24 hours. He was now ecstatic that he had almost found the culprit and all he had to do was match the fingerprints. They did not match any known criminal in the national or international database. He felt it must be someone working closely with the Institute.

He waited till 7am and called Dr. Swarna and informed all the staff of the institute to report at the auditorium when they come to work. They were told that henceforth for daily attendance marking, biometric system was being installed and they should report for fingerprint recording. Over the next 2 hours, Sanjith crosschecked each of them with the mystery set of finger prints, but none of them matched. He just had less than 2 hours for his deadline. He was dejected and crestfallen. He had run into a blind alley. There was no way he could trace the visitors within such a short time.

He went to the canteen and ordered some breakfast. This case was going to be his first unsolved case and his chief would now be forced to inform the CBI. The central agency would then take over. Sanjith could hardly eat anything. He was just sipping his tea, when Tom entered the canteen with his pets and sat down at the same table. The cute little koala tried to take a bread piece from Sanjith's plate.

Suddenly, Sanjith had a shocking thought and choked over his tea. He remembered his Dermatoglyphics Professor, Dr. Chandra. Dermatoglyphics is the study of finger prints. Dr. Chandra had once told the class about mimics of human finger prints, and that the koala bear had the closest similarity with human finger prints and even a computer algorithm cannot distinguish the two. Sanjith grabbed and hugged the koala bear and rushed to the lab. He took its prints and found them to match with the deleted file perfectly. He was now sure of the modus operandi.

Sanjith called the police chief to the Director's room and summoned Tom and the koala bear. He confronted Tom with all the evidence and Tom, had no choice, but to own up. He accepted that he had come to India with the intention of taking the vials, as he could make millions of dollars by selling the plastiphages. When the CCTV cameras were installed, he changed the settings of recording to high resolution, so that maximum space is consumed and images would be re-written. One the very first day of the Diwali vacation, he created a separate fingerprint access for his koala bear, so that even if by chance the file was discovered, the prints cannot be traced. He entered the vault with his koala and took away the vials. The vials were in his hostel room, in a suitcase. He was confident that nobody would suspect the koala. But, the superstar detective had managed to remember the trivia and beat him in his game.

Tom's passport was confiscated, his embassy was informed and he was arrested. The police retrieved the vials and returned them back to Dr. Murthy.

Sanjith was complimented and rewarded for his quick thinking. Some months later, he received a personal invite from Dr. Murthy for the Nobel Prize award ceremony.

Thus ended a scientist's quest to give back to the world on a positive note and the man with nefarious designs was given the boot.

This is a work of fiction, and any resemblance to persons, names, characters and institutions is purely co-incidental

Dr. Sushma V.
Pediatric Intensivist, Malathi Manipal Hospital

Summary of 2020 Consensus on Cardiopulmonary Resuscitation Science with Treatment Recommendations (CoSTR)

Dr Vikram S. Kumar

Epidemiology and outcome

- A retrospective analysis of patient-level prospectively collected data on 86,759 cases from 12 out-of-hospital (OHCA) registries from 12 countries documented an overall survival to hospital discharge of 10% (range, 6 – 22%).

Rapid response systems

- A comparison of the ability of the National Early Warning Score (NEWS) and the new National Early Warning Score 2 (NEWS-2) to identify patients at risk of in-hospital mortality in the countries demonstrates there is still significant work to be done in this area.
- They recommend hospitals review these documents, and that research and/or consensus are used to develop a national algorithm for responding to deterioration.

Basic Life support

- At the community and individual level, lower socio-economic status was associated with worth outcomes.
- The data highlight the need for a strategies which effectively target socio- economically deprived and hard to reach groups of our communities.
- Public access defibrillation (PAD) programmes are consistently associated with better outcomes from OHCA. However PAD deployment prior to arrival of emergency medical services occurs infrequently.This has led to health systems questioning the cost effectiveness of PAD programmes.
- The use of a smartwatch which provides real-time feedback may lead to improvement in CPR quality.
- Introduction of a text message system to activate community responders may increase bystander CPR rates and improve survival with favourable neurological outcome.

Defibrillation

- There is great interest in the use of double sequential external defibrillation (DSED) for refractory ventricular fibrillation (VF) during OHCA.
- Overall rate of VF termination and return of spontaneous circulation (ROSC) were similar with standard or DSED, although earlier DSED (attempts 4-8) was ssociated with improved rates of VF termination and ROSC.
- In a meta-analysis on 499 patients from the two published, non- randomised studies there was no effect of DSED on ROSC or survival to hospital discharge.
- A systematic review of 232 human and experimental studies documented no definitive association between the initial defibrillation dose an either sustained ROSC or survival. The authors concluded that clinicians should follow local consensus-based guidelines.

Advanced life support

- Whether advanced life support (ALS) interventions improve patient outcomes is still a perennial question.
- The authors conclude that ALS attendance within 10 minutes of the call in a tiered system may improve patient outcomes.
- In 2019/20 the ILCOR ALS Task Force produced CoSTRs on the key issues of airway management, vasopressors, and extracorporeal-CPR (ECPR) that were informed by systematic reviews.

Adrenaline

- The effect of adrenaline was greater for short term outcomes such as ROSC and less pronounced for longer term survival outcomes and favourable neurological outcomes.

Intraosseous access

- The intraosseous (IO) route for drug delivery during CPR has become more popular in recent years, despite the lack of evidence supporting its use. However, one study did show that IO access was associated with lower rates of sustained ROSC.

Airways

- The optimal airway strategy during CPR still remains uncertain.
- The evidence does suggest that if bag-mask ventilation is adequate, it would be safe to delay advanced airway interventions until after ROSC.
- Videolaryngoscopy (if feasible) was associated with an increased first attempt intubation success rate, better glottic visualisation, and a decrease in oesophageal intubation after risk adjustment and propensity matching.

Overdose related cardiac arrests

- Drug overdose related cardiac arrest is becoming a major public health problem.
- The authors estimated that globally there were about 105,000 EMS treated drug-related cardiac arrests annually.

Cardiac arrest during pregnancy

- The editorial highlights previous studies with similar findings, the challenge of managing the pregnant OHCA patient and the need for early on scene perimortem caesarean section

Paediatric resuscitation

- Based on studies of paediatric CPR assessing how children may transition between pulseless electrical activity (PEA), asystole, VF/pulseless ventricular tachycardia (pVT), and ROSC; in which, increased PEA was observed between 10 and 15 min due to a doubling of the transition rate from ROSC to PEA (i.e. 're-arrests'); the authors concluded that more work is required to increase the rate of PEA to ROSC transition and reduce the rate of re-arrests.
- Currently, there is no conclusive evidence to either support or refute the use of TTM at 32–34 °C for comatose children who achieve ROSC after cardiac arrest.
- A systematic review to determine the initial defibrillation energy dose that is associated with sustained ROSC during paediatric VF/pVT cardiac arrest reported a statistically significant association between the initial defibrillation energy dose and the rate of sustained ROSC or survival. ROSC was frequently achieved (≥ 85%) with energy dose ranging from 2 to 7 J/kg (n = 7). The defibrillation threshold varied according to the body weight and appeared to be higher in infants.
- A study of the rate of intraosseous needle misplacement in children, identified from postmortem CT scans, showed relatively high malposition rates, which was at variance with previously reported success rates of 80%.

Trauma

- Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) involves temporary occlusion of the aorta with an endovascular balloon, providing proximal control to the site of vascular injury whilst supporting cerebral and myocardial perfusion. While not a new technique, recent refinements and interest has increased usage, but without a strong body of evidence to support its use.
- In a study of 263 patients with traumatic cardiac arrest attended by a helicopter emergency medical system (HEMS) and with an average response time of 30 in, HEMSspecific interventions of blood product administration and intubation were positively associated with ROSC.

Post-resuscitation care

- Reasons for death for IHCA and OHCA were : neurological withdrawal of treatment (27% vs 73%), comorbid withdrawal of treatment (36% vs 4%), refractory haemodynamic shock (25% vs 17%), respiratory failure (1% vs 3%), and sudden cardiac death (11% vs 4%).
- Prophylactic antibiotics may reduce the incidence of post cardiac arrest early pneumonia but did not impact on mortality.

Targeted temperature management

- Mild hypothermia is known to be associated with a reduced heart rate but the reports have documented inconsistent effects on myocardial function.

Post-cardiac arrest oxygen and carbon dioxide

- The observational studies have documented an inconsistent association between mild hypercapnia and better outcome among post-cardiac arrest patients.

Coronary revascularization

- Whether patients with cardiac arrest of likely cardiac cause but without ST elevation on their ECG should undergo immediate coronary angiography or should have this delayed until later in the same hospital stay remains controversial.

Prognostication

- The prognostication of outcome in comatose post-cardiac arrest patient is one of the most rapidly evolving topics in resuscitation and many papers on this subject have been published.
- There is general agreement that accurate prognostication requires a multimodal approach and feasibility to be checked in L/MICountries.

Organ donation

- Non-surviving post-cardiac arrest patients are an increasingly important source of organs for donation.
- Post-arrest patients and families were more likely to consent to donation and more likely to be donors after circulatory death (DCD).

Cardiac arrest centres

- Whether transport of a post-cardiac arrest patient to a cardiac arrest centre instead of the nearest appropriate hospital results in improved outcomes remain unclear, mainly because of confounders associated with observational studies.

Nolan JP, Ornato JP, Parr MJA, Perkins GD, Soar J, Resuscitation highlights in 2019, Resuscitation (2020).

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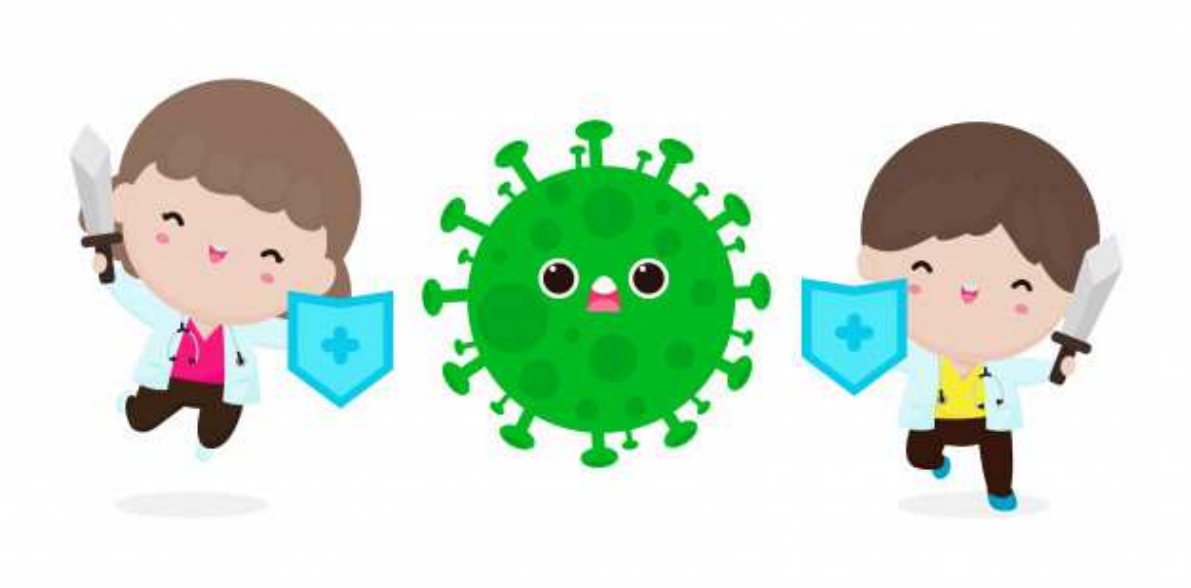

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