ARE WE WINNING?

THE WAR AGAINST MICROBES

DR DHESI RAJA

THE MALAYSIAN MEDICAL GAZETTE

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BY: DR DHESI RAJA

EDITOR: DR HIDAYATUL RADZIAH ISMAWI

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PREFACE

As the founder of the Malaysian Integrated Medical Professionals Association (MIMPA) and its online health education platform The Malaysian Medical Gazette, Dr Dhesi Raja is a great advocate for community mobilisation and promulgating medical knowledge.

This book aims to provide information on a few famous epidemics over the past 10 years for the public written in simple language by a qualified medical professional.

BIOGRAPHY

Dr Dhesi Baha Raja is a Public Health Medicine Physician who is passionate about Data Science and Artificial Intelligence. He completed his Master of Public Health and DrPH (Doctor of Public Health) in Malaysia. One of Dr Dhesi's key contributions to Malaysia was i-Kelahiran, a software that organizes birth data, immunization coverage & tracks high risk pregnancies in real time. Тhе technology was then implemented in government hospitals and clinics around Malaysia.

Moving forward, Dr Dhesi won first prize in the Global Competition and was sponsored by ECM Libra & Impact Google Singularity University in Silicon to Valley, California. During his graduate studies program there, he Artificial Intelligence co-founded i n Medical Epidemiology, a software that has t h e capability o f identifying deadly outbreaks 3 month in advance & geolocating them up to 400 meter radius.

Dr Dhesi's work in AI & Infectious Disease has also been acknowledged by various International organizations. Recently, Dr Dhesi won first prize for the Pistoia life science innovations Award in King's College London, Top 10 exceptional solution award by the United Nations in 2016 and Top 10 Under 35 Innovators Award by MIT in 2017.

Dr Dhesi was also invited by the Honorable Chancellor of Germany, Madam Angela Merkel to share his expertise on AI for Antimicrobial resistance and the use of technology to solve global grand challenges in Germany. Dr Dhesi is one of the experts that drafted the use of technology to achieve the Sustainable Development Goals for the United Nations in an expert panel meeting in New York & Geneva. Currently, AINQA HEALTH, a leading Global Healthtech organization has just appointed Dr Dhesi as the Chief Medical & Innovation Officer.





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INTRO

The Malaysian Medical Gazette is an online hub for doctors, specialists and health care professionals to spread awareness and health education to members of the public in an easily accessible and reliable platform.

With the advent of social media and information technology, the public has unlimited access to information at the click of a mouse. Their enthusiasm to take an active part in their own health care management coupled with the ease of information sharing is unfortunately often at times detrimental due largely to the fact that they are unable to differentiate between valid sources of information and unreliable ones.

In an effort to provide a more reliable source of medical and health related information, a group of doctors & healthcare professionals set up an online hub namely The Malaysian Medical Gazette (www.mmgazette.com) Dr Dhesi Raja is the founder of and a columnist for this publication an all content in this e-book is based on his MMG articles.



EBOLA

TEARS IN BLOOD

"There's no specific drug to treat Ebola. Patients need constant supervision to make sure their blood pressure doesn't crash to deadly levels, one by one they die. A Major Public Health threat to mankind"

- Dhesi Raja

Yambuku, It all started here. In 1976, major hospitals and dispensaries for almost 60,000 villagers in Zaire were operated by Belgian Catholic missionaries in a village called Yambuku. Seventeen nurses and nuns with no proper qualification ran the show. They attended to the community out of modesty. There were no doctors in Yambuku. This small team of nurses and nuns were considered the most hardworking health providers juggling between wards to keep everyone safe and healthy. The hospital had no sophisticated laboratory facilities to aid in diagnosis, so they could only guess what might be happening. Patients coming in dehydrated, bleeding from almost every part of their body. No one had any idea what was really happening. The nearest they could get was to come up with a diagnosis of yellow fever or thypus. They pumped in antibiotics, chloroquine, vitamins and intravenous fluids to offset those who were dehydrated...but they failed. Nothing seemed to work.

What more can you expect when someone bleeds from their eyes as they cry for help...one by one...they died.



They were then buried. It seemed that the healthcare workers were busier helping relatives bury their loved ones rather than saving them from this deadly microbe. By tradition, readying a body for burial requires evacuating all excreta (foods) which are usually performed by bare hand and these poor nurses and nuns had no idea what they are getting into.

As days went by, the hospitals were flooded with people suffering from the same symptoms. Panic spread as village elders spoke about a curse that made people bleed to death. The horror magnified when patients started to developed strange behaviour, some tore their clothing and ran naked, others cried with bloody tears without recognizing their wives, husbands and children. The situation was getting out of hand to the point that some infected people were even burned by hysterical neighbours.

Finally, one of the Medical Directors in Zaire, arrived. Dr Ngoi Mushola. But he was helpless as no one had any clue of the disease. He started collecting every case, clinically laboratory samples. Nothing and helpful had been discovered. Professors and academicians flew in to Yambuku to solve this mystery BUT unfortunately they brought no protective gloves, masks and gowns for their use during procedures which left them in hazardous contact with infected blood. Everyone worked around the clock to solve this mystery and they found NOTHING. Autopsies carried out for sophisticated laboratories then were analysis. Again they found NOTHING.

Dr William Close, who was the personal physician to President Mobutu Sese Seko directed a nongovernmental medical development group called Cooperation Medicale to help out. He then contacted CDC Atlanta to seek full laboratory support to determine the outbreak in Yambuku.

Back in the hospital, more staff contracted with the disease. Now, ten of the seventeen employees were either dead or too sick to continue to serve the community. Things were getting out of control, the only weapon they had were ... PRAYERS.



President Mobutu expressed concern about containing the epidemic, ordered all roadways, waterways and airfields in the region to be placed under martial law. This lead to a more devastating situation whereby the transportation of food and goods in and out of the area came to a full stop within a week. Yambuku and the villages surrounding Yambuku looked like a ghost town. What a horrible nightmare for everyone, remenisce of the smallpox epidemic of the 1960's.

At the same time the scientist heard news that there was another strange epidemic in a town called Maridi, southern Sudan. Information was scarce and the authorities in Sudan had no radio contact. However rumours spread that it resembled those in Yambuku. With the help of WHO in Geneva, from the distant vantage point, they immediately ordered all blood and tissues samples from Maridi & Yambuku to be sent to Geneva. The greatest fear was the epidemics of Yambuku and Maridi were one and the same, representing a disaster spanning over 1,000 square miles in at least two nations. In view of this, WHO enlisted high security laboratories all over the world. Blood samples and tissues from Yambuku and Maridi was sent to CDC Atlanta, to UK (Microbiological Research Establishment, Porton Down, Salisbury), to Belgium (University of Anvers), West Germany (Bernard Nocht Institute for Naval & Tropical Disease and France (Branch of Pasteur Institute).

Peter Piot, a 27 year old young boy, completing his virology post doctoral research in Anvers was part of the team. Piot eagerly prepared the sample for analysis; he gasped and stared at the strange virus. "THIS IS A NEW VIRUS!!!" he exclaimed feeling the thrill of discovery. They were shaped liked question marks. The virus was a long wormlike tube that coiled at one end and extended on the other end.

Just about the time that Piot discovered something new, WHO telexed that everyone in the group should cease research immediately since it could be the existing Marburg Virus that was killing the people in Africa.

Piot, marched to the Belgian Ministry of Development Cooperation and argued this case with his list of facts and analysis. Belgian government told him, "Okey Piot, we give you one week". Finally everyone agreed with Piot. On October 10, scientists informed WHO, that the illness was caused by a virus that resembles Marburg and that the epidemics in Zaire and Sudan were probably caused by an etiological agent that was similar to but represented a new type in the family of Marburg.

As days went by, many more were dying, it was important for every epidemiologist and scientist to come up with a laboratory diagnostic method in order to detect this viral culprit.

O.

Johnson, a virologist came with up Karl something interesting at that crucial moment. His plan was to diagnose patients by putting patients blood sample on the microscope slides, waiting a while and then rinsing the slide. Those patients who are infected would develop antibodies against this mysterious microbe that would latch on to the infected vero cells. He then planned to put fluroscein, a molecule that glows under ultraviolet light and when he shone the ultraviolet lights to his slide, he will be able to detect which patient has an infected blood. Brilliant idea, time saved, lives saved. Finally they had a way to test who was infected and who had developed immunity towards this disease.

A full scale epidemiological survey for all the villages surrounding Yambuku was conducted, involving International Agencies. For nearly two weeks, the special task force augmented by dozens of trained local volunteers participated, surveying almost 550 villages, interviewed almost 34,000 families and took blood samples from 442 people. On November 6, Zaire's Minister of Health finally issued an International report that of the 358 cases of the viral disease, 325 were fatal leaving our fatality rate at 90.7 percent. This agent was a new virus and it was "EBOLA", named after a river in the region where the disease's first case appeared.

It has been almost 40 years since it had been discovered and now, this horrifying virus is back causing deadly outbreaks in Liberia, Sierra Leone, Guinea. 1093 probable, confirmed and suspected case have been reported and out of that, this virus has killed almost 650 people till this very day. One can contract the disease through bodily fluid and it takes 2 to 21 days for someone to develop symptoms and infect another person. Patients will develop early symptoms such as fever, headache, sore throat, joint pain and lack of later stages, patients develop At appetite. vomiting, diarrhoea and internal bleeding. Sadly, there is still no treatment or cure. Nevertheless, the infection can be controlled through proper preventive measures with the use of recommended protective gears in clinics and hospitals, at community gatherings, or at home. Due to the early detection and aggressive prevention, the fatality rate hovers between 60% and 90% in affected outbreak region.



Dear readers, this disease is deadly and contagious. Human to human transmission through bodily fluids via direct and indirect way is one of the main reasons why more people are dying today. I will end this with confidence that "Despite the fact that Ebola has been around the African region for 40 years and it is not something new, the condition is worsening and this is closely related to culture and behavior. It will not stop there, if the local community and authorities do not take a pro active role in preventing the disease through community mobilization and empowering them with the knowledge on basic hygiene, hand washing, universal precautions, food handling etc, it will kill more people. The same thing applies to us, Dengue is still within our reach, so let us all take full control of the disease and start today before it gets out of hand. You would not want to see the same scenario here..... Act today.

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H7N9

ARE WE EXPECTING A PANDEMIC?

"Outbreak spreading from mainland China which include H5N1 (1997) and SARS (2003), have put the territory on health alert."

"We will heighten our vigilance and continue to maintain stringent port health measures in connection with this development," the Centre for Health Protection in Hong Kong stated in a previous press release.



Now comes a new ongoing mystery...the clock is ticking, and the world wants answers. If we were imagining how a terrible pandemic (world-wide outbreak) would unfold, this could certainly serve as an excellent script. A forecaster might reasonably conclude that H7N9 is likely to follow a H5N1-like path, causing only occasional but frightening cases in people, and never spawning a human pandemic. However, there are reasons to believe the numbers of human cases, especially milder ones, are wildly wrong, directing our eyes to that dicey H1N1-like path. Let's hope it will not be fatal and easily spread. We should understand this phenomenon before we conclude our story. I will try my best to explain in layman terms and will not touch on molecular level of the disease instead more on the disease pattern and distribution. H7N9 is a subtype of the influenza virus that is sometimes found in birds, that does not normally infect humans. Influenzas are named according to the specific nature of two proteins found on the virus itself — the H stands for hemagglutinin and the N for neuraminidase. These proteins play various roles in the flu-infection process, including latching onto receptors on the outside of the cells of animals to transmit the virus into their bodies. Those receptors can vary widely from one species to another, which is why most types of influenza viruses spreading now around the world are harmless to human beings and mainly effects animals and birds.

The H7N9 forms of flu have never previously managed to infect human beings, or any mammals. It is a class of the virus found exclusively in birds. It is therefore extremely worrying to find people killed and barely surviving due to H7N9 infection.

If you still remember, it was a devastating event when China announced its outbreak on March 2013. The H7N9 outbreak in China offered a long list of puzzles, many of which are the key to understanding whether this Chinese epidemic will erupt into a global pandemic or not. In order to better understand this phenomenon, let us view some statistics as depicted in the tables and graphs. H5N1 avian flu, which has spread among birds and humans since the 1990s, has an opposite case distribution as compared to H7N9. Most of the 371 deaths caused by H5N1 since 2003 have been in children. Why? Some reasonable scientist stated that youngsters play around with chickens, ducks and other poultry that may be infected with the virus in their own family farm. Well I ask myself, why not the elderly? In a way, we should be thankful that the virus did not react on the elderly or we might be seeing more fatalities.

Characteristic	Patients with Confirmed Cases (N=82)
History of exposure to animals — no./total no. (%)§	59/77 (77)
Chickens	45/59 (76)
Ducks	12/59 (20)
Pigeons	8/59 (14)
Quail	1/59 (2)
Geese	1/59 (2)
Pet birds	1/59 (2)
Wild birds	6/59 (10)
Swine	4/59 (7)
Cats	2/59 (3)
Dogs	1/59 (2)
Type of exposure to animals — no./total no. (%)	
Direct contact with poultry	34/59 (58)
Direct contact with swine	2/59 (3)
Visit to live poultry market	38/59 (64)

Even normal or seasonal flu that circulates every year will affect and kill people in a different pattern, distribution and are usually skewed towards over-70-year old adults and roughly equally by gender. However the gender distribution is slightly different in the case of H7N9 (more towards male) and it affects adults and elderly (like other seasonal flu). This can be devastating as H7N9 is fatal, and if it affects the elderly we will inevitably see more deaths in our health care centers.

We can also interpret these facts in two different ways. Firstly, the distribution towards older men may offer a clue to which animal or bird species is the host of the virus, from which the men are acquiring their infection (if not from other people) but direct contact, in other words directly from the source. Secondly, the older men may be especially vulnerable for some reason. As WHO put it: "It may be due to an imbalance in exposure of the elderly to H7N9, or physiological factors related to aging, such as decreased immune function."



Analysis of the first 82 cases in China offers some vital clues, at least for the 77 individuals the Chinese CDC was able to interview before they passed away. A handful of the individuals had occupational-related contact with animals, as poultry workers, butchers or chefs. The remainder had some contact with chickens or chicken meat, and a few other avian species. The numbers point to chickens (see Table 1). Why male and not female? In my opinion, women prepare meals in China, pluck the chicken feathers and handle food at home and if household chicken exposure is the key to infection, the gender distribution of H7N9 cases makes little sense since more male are affected than female (Figure 1). So I strongly feel, livestock, domestic animals, live birds play a vital role in MOT (mode of transmission) during the contact of these animals in the farm or wet market itself and not dead or cooked meat that are brought home.

Since we now understand the disease dynamic, let's now proceed to the real game. Will we actually face a great pandemic with H7N9?Due to continuous pressure from WHO, for the first time ever, a comprehensive genetic analysis of the H7N9 bird flu virus was carried out by scientists in China.It was then followed by a recent study published in the Lancet, researchers have confirmed that the A type H7N9 bird flu virus, which began in February 2013, was transmitted from chickens at a wet poultry market to humans.The diversity among the specimens collected suggests that the H7N9 virus might have evolved into two different lineages. This is troubling news for all scientists and WHO. These are some of the exact words by the scientist; "The H and N genes might originate from duck avian influenza viruses, which might have obtained the viral genes from migratory birds a year previously, whereas the internal genes might come from chicken avian influenza viruses. In particular, this novel H7N9 virus has diversified into different lineages since its emergence several months ago."

I think the last statement from those scientists gave us an insight into how capable H7N9 can evolve, and that definitely answers our pandemic question; will we face a pandemic?

Influenza viruses constantly change and it is possible that this virus could easily and sustainably spread between people, triggering a pandemic.



It is in our gut fear, as H7N9 can possibly bring worldwide transmission of a dangerous new form of flu that could spread unchecked throughout humanity, testing global solidarity, vaccine production, hospital systems and humanity's most basic family and community instincts. Therefore, it is imperative that extensive global surveillance is carried out to ensure that domestic-poultry-to-person transmission is carefully watched.

Let's start with proper surveillance today.

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H1N1 IN SABAH

SHOULD WE PANIC?

Before I start let me explain:

- Pandemic; A pandemic is a global disease outbreak. It is determined by how the disease spreads, not how many deaths it causes.
- Seasonal Flu; Seasonal flu is a contagious respiratory illness caused by flu viruses. It spreads between people and can cause mild to severe illness.



Seasonal influenza

Seasonal influenza viruses circulate and cause disease in humans every year. In temperate climates, disease tends to occur seasonally, spreading from person-to-person through sneezing, coughing, or touching contaminated surfaces. Seasonal influenza viruses can cause mild to severe illness and even death, particularly in some high-risk individuals. Persons at increased risk for severe disease include pregnant women, the very young and very old, immunecompromised people, and people with chronic underlying medical conditions. Seasonal influenza viruses evolve continuously, which means that people can get infected multiple times throughout their lives. In other words, you can get H1N1 multiple times.

What is Influenza A, B, C?

There are 3 large groupings or types of seasonal influenza viruses, A, B, and C.

Type A influenza viruses are further divided into subtypes according to the specific variety and combinations of two proteins that occur on the surface of the virus, the hemagglutinin or "H" protein and the neuraminidase or "N" protein.

Currently, influenza A (H1N1) in Sabah are the circulating seasonal influenza A virus subtypes. This seasonal A (H1N1) virus is the same virus that caused the 2009 influenza pandemic, as it is now circulating seasonally. In addition, there are two type B viruses that are also circulating as seasonal influenza viruses, which are named after the areas where they were first identified, Victoria lineage and Yamagata lineage.

Type C influenza causes milder infections and is associated with sporadic cases and minor localized outbreaks. As influenza C poses much less of a disease burden than influenza A and B, only the latter two are included in seasonal influenza vaccines.

Pandemic influenza

A pandemic occurs when an influenza virus which was not previously circulating among humans and to which most people don't have immunity emerges and transmits among humans. These viruses may emerge, circulate and cause large outbreaks outside of the normal influenza season. As the majority of the population has no immunity to these viruses, the proportion of persons in a population getting infected may be quite large. Some pandemics may result in large numbers of severe infections while others will result in large numbers of milder infections, but the reasons behind these differences are not completely understood. The most notorious pandemic for which data are available was the "Spanish Flu" in 1918-1919 which caused an estimated 20deathsworldwide. 40 million Subsequent or more pandemics in 1957 and 1968 resulted in many fewer deaths in spite of large portions of the world's population being susceptible to infection. In 2009, a strain of influenza A (H1N1) virus which had not ever been seen before, emerged, spread across the world and caused the 2009 H1N1 pandemic. This pandemic A (H1N1)2009 virus has been widely circulating across the globe since 2009, and is now established in human populations as a seasonal influenza virus, as described above. Currently there is no longer a pandemic virus circulating in the world.



Conclusion H1N1 in Sabah

Sabah health officials detected H1N1 flu virus at the Likas Women's and Children's hospital. Hospital director Dr Tan Bee Hwai via StarOnline said five children and two adult caregivers had been tested positive for the flu virus.Influenza A (H1N1) 2009 virus that has been widely circulating across the globe since 2009, is now a seasonal influenza virus. A pandemic only occurs when an influenza virus has not previously been circulating among humans. For instant Egypt, 85 % of flu cases reported recently in Egypt are due to H1N1, this is not unusual as H1N1 has become seasonal flu.



In view of that, there is NO NEED to panic, the priority for now is to stop the transmission which includes quarantine protocols and getting everyone to practice personal hygiene, for example washing hands and the use of proper face masks. So remember, seasonal influenza viruses can only cause mild to severe illness, particularly in some highrisk individuals; pregnant women, the very young and very old, immune-compromised people, and people with chronic underlying medical conditions.

*Opinion article published on mmgazette.com in 2014



MERS-COV

IS IT TIME TO WORRY?

There are raising alarms on the recent MERS cases in Malaysia and the United States. We have seen a sudden jump of cases since the disease was known to mankind since 2012. Allow me to introduce you to this creepy virus that has killed 93 people in 12 different countries and uniquely originated from 6 different countries in the Arabian Peninsula. MERS; Middle East Respiratory Disease is part of the coronavirus family. Viruses from this family can cause a variety range of illness from normal flu or cold to SARS like disease. Surprisingly, this virus has spread from ill people to others but only through close contact and not through a sustained way in communities. Mmm....Guess the situation is still evolving.

MERS was first known as "Novel Coronavirus", the term novel referred to something new among the coronavirus group. It was also called as n-CoV (Novel Coronavirus). Scientist then knew that this creepy virus was from a different sub group since it did not have the molecular characteristic of SARS. After extensive research, they then group n-CoV as a beta coronavirus. So in any case, do not panic, it is not SARS. The Coronavirus Study Group (CSG) of the International Committee on Taxonomy of Viruses (ICTV) then decided in May 2013 to call the novel coronavirus "Middle East Respiratory Syndrome Coronavirus" (MERS-CoV), the term which we are using today and I am sure it was not an easy task to name this creepy virus. Took them a long whole 1 year to identify and name MERS.



As creepy as it sounds, the number of confirmed cases kept growing and recently MERS has been found in Malaysia, the Philippines, Yemen, Greece and even the US. All the victims had recently travelled to the Arabian Peninsula.

Remember, MERS only spread through close contact. WHO (World Health Organization) supported this statement by concluding that three quarters of the recent infections were secondary cases, that is, they caught the virus from another person through close contact. Most of these secondary infections have also occurred in health care facilities, with the virus being passed to healthcare workers and other patients.

Till today, most of the new cases have been mild and it is said that secondary cases are less likely to spread the virus....BUT our caution is, much is still unknown on how MERS is transmitted.

I quote "According to Dr. Michael Osterholm of the Center for Disease Research and Policy (CIDRAP), the disease may have "reached a tipping point and could be ready to spread out of the region." He cautioned that, "It took us over a year to get the first hundred cases of this viral infection, now in just the last two weeks, we've had a hundred cases. ... There's a major change occurring that cannot just be attributed to better case detection. Something'shappening."

So now comes the golden question.... Isn't this contradicting? From one end I tell you not to panic and on the other hand Dr Michael tells you that something major is occurring, something's happening.....



Well, different scientist, different doctors have different opinions. Main stream media, social media can give you the best information that you want to hear, but our duty here is to give you the best health knowledge that is applicable to our own local setting in Malaysia.

For now, CDC, WHO and even the Ministry Of Health, Malaysia is trying their level best to increase the surveillance level of this disease, to study the molecular level of the disease and even the epidemiological link of this disease to stop this disease from spreading. Till today, we don't exactly know who to blame? I mean the source of the disease. Is it the camels? The bats? Based on these hypothetical questions, MERS virus has been found in camels in Qatar, Egypt and Saudi Arabia, and bats in Saudi Arabia, some camels even tested positive for antibodies to MERS virus, indicating they were previously infected with MERS virus or a closely related virus. However, we don't know whether camels are the source of the virus since thorough study is needed to identify the possible role that camels, and bats in the transmission of MERS virus. So here comes another golden question? Am I at risk to be infected by MERS in Malaysia? I will confidently say no, you are not considered to be at risk for MERS infection if you had no close contact, with someone who is being evaluated as a risk of MERS infection or travel history to the Arabian Peninsula.

However, if you develop flu like symptoms; such as cough or shortness of breath, within 14 days after traveling from countries in the Arabian Peninsula, don't hesitate to see your healthcare provider and remember to mention your RECENT TRAVEL.



Well, for now, let me remind you that there are NO VACCINES and NO TREATMENT for MERS. The only way to protect ourselves is to practice Universal Precautions. Take few seconds to learn and understand. Adopted by CDC: Tips.

- Wash your hands often with soap and water for 20 seconds, and help young children do the same. If soap and water are not available, use an alcohol based hand sanitizer.
- Cover your nose and mouth with a tissue when you cough or sneeze then throw the tissue in the trash.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Avoid close contact, such as kissing, sharing cups, or sharing eating utensils, with sick people.
- Clean and disinfect frequently touched surfaces, such as toys and doorknobs.

In conclusion, "In this 21st century, human being travels faster than the incubation period of an infectious disease and that is enough to spread deadly diseases. I rather think it's a small world when it comes to diseases".

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As the founder of the Malaysian Integrated Medical Professionals Association (MIMPA) and its online health education platform The Malaysian Medical Gazette, Dr Dhesi Raja is a great advocate for community mobilisation and promulgating medical knowledge.

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