Source: The Sunday Times, Page A6-A7
Date: 6 October 2019

Ultimate gift to medicine

They have died. But their bodies remain intact for up to three more years in the service of science. Over the course of almost a year, Sunday Times journalist Calvin Yang and photojournalists Kua Chee Siong and Mark Cheong documented the journey of these medical cadavers.

Serving others, even in death

Cadaveric donors include teachers, housewives, scientists, taxi drivers and doctors. They have ranged in age from their 30s to 90s. Here are two of them:

COLIN CHOO KWOK LEONG

He was in one of Singapore's first batch of national servicemen. He was commissioned as an artillery officer, received the Sword of Honour given to top officer cadets, and later rose to the rank of Lieutenant-Colonel as a reservist.

He died of prostate cancer last Christmas eve, at the age of 75.

"He strongly believed that once a person dies, the cadaver is nothing more than a piece of meat," said Ms Dawn Choo of her father, who pledged his body on Oct 25 last year. "The thought of being able to be of service, even in death, to young doctors and researchers excited him tremendously.

"I often reminisce about that twinkle in his eye, that fleeting surge of energy in his frail body, when he understood he could die purposefully."

His three children, aged 33 to 47, grew up in a military household where he was the commanding officer and they were his cadets. But in his final days, his thunderous voice was reduced to a whisper.

"He had wished to start a revolution to encourage more body donations, but with the little time he had, he could only start with himself," said Ms Choo, the eldest child.

At least five family members, including all three children, his son-in-law and sister, have since pledged their bodies.

"Such is the infectious nature of our dear old man," said Ms Choo, a project consultant, admitting that she is unsure how the donated bodies would be treated.

"Perhaps there is no need to know. We are sending his body to a team of young students, mistakes are bound to happen," she added. "None of us are expecting a pristine body to return. I would rather those mistakes now, on dad's body, than in a real patient scenario."

RAMESHCHANDRA RANCHODAS

The 87-year-old, who died on March 8 last year, believed in education, said his son, Mr Rajesh Shah.

At the age of 17, Mr Rameshchandra, the eldest son of 10 children, was pulled out of college in his first week and arrived here from India to work. It included hawking watches, clothes and cameras as a salesman in a department store.

He worked hard to send money back, "so that all the others could get educated", said Mr Rajesh, 55, an interior designer. To make a better life here, the father of three put himself through accountancy night classes, worked his way up from an accountant to the general manager of a fan manufacturer, and later started his own furnishing business.

"He gave (his body) because he knew it would help students. That was his last wish," said Mr Rajesh.

The four students bowed their heads before a portrait of a teacher they had never met in life.

Next to them stood his grieving widow, to whom he had been wed for 50 years, and their children and grandchildren.

They had all come to this hushed hall in Mandai Crematorium to bid farewell to Mr Hardial Singh, a pioneer botanist whose dedication to science did not cease with his death.

Instead, he had donated his body to the National University of Singapore's Yong Loo Lin School of Medicine. The entire body – measuring 170cm from head to heel – had been preserved, dissected and examined in the education of future doctors.

In death, the 77-year-old had taught human anatomy to more than 100 doctors-to-be.

The role cadavers play in medical education is why those donated to the school are referred to respectfully as "silent mentors".

It is a donation given out of the public eye – plenty of people believe it to be a macabre one – but over the past 10 months, The Sunday Times was able to go behind the scenes and see the irreplaceable role they play.

SILENTLY MENTORING FUTURE DOCTORS

At Mr Singh's final send-off, family and friends laid down flowers – his lifelong passion – on the closed coffin before taking a moment of silence in the cavernous room.

His body, which bore hundreds of cuts that had been carefully stitched up, was taken away and cremated at 9.26am on Aug 30 – 554 days after he died of throat cancer.

In a way, Mr Singh's donation was a blessing to his family as well, for it felt like he had never left, said his son, Gino, 47, a criminal lawyer and the older of two children. "There was relief knowing that he was going to be around. We had more time to grieve and come to terms with what happened."

The cremation of Mr Singh brought closure to his family.

But for his students, it was a kind of beginning to get to know the man they had thought of as a teacher.

Second-year medical student Ryan Teo had often wondered about Mr Singh's life.

"Interacting with the family during the cremation helped us understand who he was," said Mr Teo, 22.

"To us, he was our silent mentor. But to them, he was a husband, a father."

Since 2012, more than 130 people have donated their bodies to NUS, through a programme to promote body donation for science.

Associate Professor Ng Yee Kong, coordinator of the Silent Mentors Programme started in 2012, said students are told "it is a privilege, rather than a right" given to them by this group of people. Donated cadavers are used in teaching for up to three years.

"These silent mentors are unrelated to them, but had so graciously and selflessly donated their bodies to education and research," he said, noting that their families have also had to wait to say goodbye. "Donating a body is not one person's decision. It is often a family decision."

Mr Singh died in Singapore General Hospital just past 11am on Feb 22, 2018 – three weeks shy of his 78th birthday. His body was afterwards wheeled away, and his corneas removed to be donated to a young girl and a woman in her 30s.

By 4pm, his body had been received by the school, and within days, embalmed with formaldehyde – a chemical used to preserve a cadaver – before it was stored in the chiller, at 4 deg C.

Mr Singh joined the Botanic Gardens in 1963 as a senior officer, eventually becoming deputy commissioner in the maintenance division of the then Parks and Recreation Department. He retired in 1996 at age 56. In his younger days, he studied botany at the University of Malaya in Singapore, later gaining a master's degree in horticulture from the University of Hawaii under an East-West scholarship.

The perfectionist, who specialised in the cloning of orchids, had played a big role in creating Singapore's reputation as a Garden City by introducing more variety, colour and fragrance. It included attaching sweet-smelling wild orchids to the branches of roadside trees in the main shopping district of Orchard Road.

His children remember him as a disciplined man of sharp intellect who could also be a hard taskmaster.

But Mr Singh, with his oval face, chiselled features and piercing eyes, was also a romantic at heart, said Madam Sudesh Kumari. The pair got married three days after they met.

Even in his final days, when he was feeling weak, "he would pull me close and hug me", she added. "He told me, 'I don't want to leave you.'"

In the final few years of his life, Mr Singh kept in his dark blue wallet a card stating that if anything happened to him, his whole body was to be given to medical science.

Madam Sudesh, 75, found out only after he had done it.

"He came home one day, and said he had pledged to donate his body," she told ST, speaking at their two-storey house in Bedok, where they raised two children. "I just walked away. Of course, you don't want to think about losing your loved one."

But it did not surprise his daughter, Mrs Gina Hardy, who now lives in Trinidad and Tobago. "He took a studious approach to everything, even if it was a book on poetry," said the 44-year-old chocolatier, recalling the notes he had made in the pages of books she had given him.

Her father remained committed to research, she said, adding: "I don't think dad ever left anything half-done. Perhaps that's the same with his body.

"It was his ultimate gift."

Seeing how his donation has benefited others, Madam Sudesh is now planning to do the same.

PRESERVING THE BODY

With a recent increase in donations, the medical school has been able to offer more teaching opportunities, such as surgical simulation workshops and dissection electives.

Last year, there were 33 whole body donations to the school, more than five times the number received in 2012. This year so far, it has received about 15 donated bodies.

Prof Ng was surprised that members of the public have been willing to come forward, saying: "Initially, we thought Singapore was conservative, but we were wrong."

He attributed the upsurge to greater public awareness and the assurance that the departed would be handled sensitively.

When a donor's death occurs, transplant coordinators from the National Organ Transplant Unit (Notu) are called into action. These individuals help the family understand how the deceased would be of help to students, and sort out any requests they may have, before the body is released to the school.

Some families will hold a wake for up to three days before giving the body to the university, while others may hand over their kin a few hours after his or her death. Coordinators will liaise with the university for an appropriate time to receive a body.

Besides such donations, cadavers are also obtained when bodies are unclaimed – the school's traditional source. But this quantity fluctuates, stressed Prof Ng. "It is not a reliable source."

To carry out its current activities, the school relied on about 30 donated cadavers this year, he noted.

An increase in the number would expand teaching opportunities further.

"Using human bodies is still the best for learning because that is as real as it gets," he explained.

In the past, doctors and medical students in other parts of the world bought fresh corpses just to practise their surgical techniques or perform experiments. It led to a black market of body snatchers, who stole unclaimed bodies or cadavers from fresh burial sites.

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Madam Sudesh Kumari (centre) paying her last respects at the cremation of her late husband, Mr Hardial Singh, at Mandai Crematorium on Aug 30. Flanking her are their two children, Gina (left) and Gino.

Ms Mita Shah tossing the bundle with the ashes of her father, businessman Chandrakant Mohanlal Shah, into the water on Aug 3. With her are family friend Bharat Damani and sister Naina Shah. Mr Shah died in 2017.

Above: Students, with one hand on a cadaver, take an oath to treat the body with dignity.

Left: Medical students dissect a cadaver as part of an elective. Such classes can last at least six hours a day in the school's anatomy hall.

In the large back room of the medical school's anatomy hall, rows of cadavers sleep. It is in here that dozens pass through to be preserved.

Floor-to-ceiling storage coolers with bodies in columns of five line the walls of this mortuary. At the rear, metal tables sit empty.

The facility can keep up to 100 cadavers – 20 in the freezer, set at minus 20 deg C, and 80 in the chiller, fixed at 4 deg C.

Bodies stored in the freezer are used in surgical workshops as they are not embalmed and "give the natural feel of an actual human being", said Prof Ng. These are cleaned up and put away below freezing point to "stop or slow down the decomposition of the bodies significantly".

"Once you embalm a body, its texture is different. It is hard and the tissues tend to fuse together", he explained. "If you want to learn surgical procedures, you need as natural a body as possible."

But it is often a fight against time as these "fresh cadavers" need to arrive at the school within eight to 10 hours after death. Beyond that, the rate of decomposition rises because of the temperature and humidity.

Those that are beginning to decompose will be embalmed. Laboratory technicians prepare a formaldehyde mixture that is later infused through major arteries of the body. A pressure pump is needed to force the fluid into circulation, so every part is suitably preserved. This takes a few hours.

"After that, we leave the body overnight to see whether the various parts are properly embalmed," said Prof Ng. If not, a second round of infusion or a local injection is administered before the preserved bodies are returned to the chiller.

'IT FEELS SOFT AND COLD'

In June this year, Mr Teo and his fellow students had their first lesson with Mr Singh, spending about six hours a day over a few weeks in the anatomy hall, learning first-hand the intricacies of the human body.

The future doctor began by slicing the leathery skin superficially with a scalpel and pulling it back. He then cut through the yellowish fat underneath, before meticulously spreading the thin layer of fascia covering the internal structures with a pair of scissors – or when necessary, with gloved fingers.

Beside him stood a black-and-white photograph of Mr Singh, along with his name and age, as well as the date and cause of death.

"We tried to be careful with every incision," said Mr Teo, who also handled Mr Singh's heart, which had undergone a triple bypass years ago.

"We learnt about the organs and their relation to one another. It is something that would be hard to understand just from our textbooks."

In their first week of school, first-year medical students at NUS turn up for class in the anatomy hall, where body bags are laid out on rows of metal tables.

A slight trepidation hangs in the air and the first thing that hits is the pungent odour of the formaldehyde, making the eyes water.

Students are split into groups of 10, with each group assigned to a cadaver.

Second-year medical student Aubrey Ng Ding Rui, who took the Anatomy Student's Oath last year, recalled: "We were asked to unzip the bags, place our left hand on the cadaver and raise our right hand to take a pledge to treat them with respect. When you touch the cadaver, it feels soft. And you realise that you are working with a human body."

This initiation rite is the students' first encounter with a human cadaver – and an uncomfortable one for some. The feelings of unease fade away only after weeks of learning.

At NUS, first-year medical students attend anatomy prosection lessons, where they work with cadavers that have already been dissected, to learn more about the body's intricate structures.

In recent years, these junior students have been able to dissect cadavers in elective classes. Such classes – which can last over six hours a day during a school break – allow them to get a feel of what it is like to handle a body during surgery, something their seniors in earlier years were not able to experience. In 2003, the school stopped its dissection classes amid a shortage of cadavers.

The elective was reintroduced in 2016, made possible by an increase in donated bodies. Some 60 students took it that year.

Since then, it has drawn more participants. About 120 students did it in 2017, and around 180 last year.

This year, some 300 students, including about 10 dentistry and 40 medical students from the Nanyang Technological University's Lee Kong Chian School of Medicine, took the elective.

Unlike normal anatomy lessons, which use pre-dissected specimens, the elective lets students explore the complexities of the human body on their own. They dissect everything from muscles to organs, isolate parts and scrutinise the details.

"When they dissect from skin-deep, there is a lot of fascia and fats," said Prof Ng, adding that these do not exist in the cleaned-up, prosected specimens. "They get to see the variations between the bodies of two different individuals."

Some donors had succumbed to diseases, like renal disease and breast cancer, giving learners a chance to study the relation between an affected part and another.

But while medical expertise is important, doctors also need to be able to empathise with their patients, said Prof Ng.

Some students, before they begin a day's session, greet their silent mentors chirpily. Others converse with them as if they were still living.

"Sir, I am going to stitch up your right foot," a student was overheard saying to her silent mentor before holding back the skin with a pair of forceps in one hand and using the other to patch up the opening.

Since last year, students are required to suture the incisions they have made on the donated bodies, said Prof Ng. "It is their first exposure to suturing, which is very important for future doctors."

They are not the only ones to benefit from donated cadavers.

Since 2017, trainee surgeons have been able to operate on them in surgical simulation workshops. They work with "fresh" cadavers – or unembalmed bodies.

A workshop for plastic, reconstructive and aesthetic surgery residents was ongoing when ST visited on the morning of Aug 2. One resident, under the supervision of a consultant plastic surgeon, was seen steadily making an incision on the forehead of a female cadaver to create a flap used for large nasal defects. The doctors proceeded to work on other body parts during the full-day session.

Dr Chance Goh, 31, a senior resident at the National University Hospital's division of plastic, reconstructive and aesthetic surgery, said cadavers offer doctors opportunities to fine-tune their surgical approaches on various body parts, including the head and limbs. "Such workshops are precious. Through these practices, we become more competent at what we do."

'DON'T LOOK BACK'

Every year, medical students hold appreciation ceremonies, where they share reflections, read poems and perform songs to remember the sacrifices of the silent mentors and show gratitude to their families, who are also invited.

The silent mentors do not reside in the school forever.

Donated cadavers are used for up to three years, after which they will be cremated. For many, the ashes are then scattered at sea.

On the morning of Aug 3, the ashes of 16 silent mentors – wrapped in a white cloth and placed in a square box with their name on it – were carried out of the anatomy hall. Their final farewell began with a 50-minute journey from the school in Kent Ridge to Changi Point Ferry Terminal, where family members waited.

It was one of the biggest send-offs for the medical school, with seven bumboats reserved for the family members, medical students, faculty staff and Notu representatives.

Pensive looks, an uncomfortable silence and the occasional fits of sobbing filled the 10-minute boat ride.

At 9.59am, the motors were cut and the boats coasted side by side into formation in the middle of the sea. Bulky hemp ropes were hurled from one boat to another and tied to form a makeshift floating platform.

Families and friends gingerly made their way to the back of the boats, where they were finally able to release their loved ones to nature.

Some knelt, clasped their hands and prayed. Others sprinkled the ashes over the waters while wailing uncontrollably. "Yi lu hao zou (a Chinese phrase for "safe journey")," a group cried out in between sobs as the ashes floated away.

For the send-off of businessman Chandrakant Mohanlal Shah, who died months after a stroke in 2017, there was only moving on. The 89-year-old – who pledged his body in 2013 – was a strict parent to his five children, aged 51 to 64, but was the "coolest, wildest" grandparent to his nine grandkids.

"Don't look back," one of them exclaimed, as Mr Shah's third child, Ms Mita Shah, 59, tossed the bundle with his ashes high, overhead and backwards into the waters.

Ms Naina Shah, 62, the second of Mr Shah's five children, told this reporter later: "It is said in our custom that we should not look back when throwing the ashes as we need to move on and live."

While the silent mentors are being used at the school, family members occasionally – during their death anniversaries or birthdays – leave flowers under a memorial board outside.

Second-year medical student Poon Wynne Hsing spent several weeks incising and examining her silent mentors during the school break this year. The few details she had about the cadavers, including their names, reminded her that they were once alive and had families waiting, said the 20-year-old.

"These families held off closure so we could learn from their loved ones. So we made sure every incision was made carefully."

No doubt medical students learn to care for the living by first looking after the dead.

She said: "These donors may not know it, but they do more than give their bodies.

"They are also our teachers."

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