

The story of Virginia Apgar



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From woman to acronym

According to a well-known medical cliché, every baby born in a hospital is first viewed through the eyes of Virginia Apgar. This seemingly weird expression is in fact correct. From the moment a newborn opens his/her eyes for the first time, he/she will be tested according to the APGAR score. A midwife or physician will look at the skin colour, respiration, pulse rate, muscular tone and reflexes. These are the five variables Virginia Apgar once came up with to estimate the condition of an infant. The score varies between 0 (lifeless) to 10 (in excellent health). Since its introduction in 1953, the Apgar score is applied worldwide and has saved thousands of lives. The overall contribution of Doctor Virginia Apgar to medicine however, reaches much further than her renowned score.

Beginnings of Apgar

Virginia was born on June 7th 1909 in Westfield (New Jersey, United States) as the youngest of three children. Her father was an insurance agent and had numerous hobbies. As an amateur astronomer, he assembled his own telescope. As a pioneer radio amateur, he experimented with electromagnetic waves. As a talented musician, he played several instruments and taught his children to play music. So father, so daughter, apparently, and Virginia too excelled at school in practically everything. Not just in theoretical subjects, but in various sports as well. She acted in school plays, played the violin in the school band and wrote contributions in the school newspaper. A teacher once wondered: "... frankly, how does she do it?" The only thing she was bad at, presumably, was cooking.

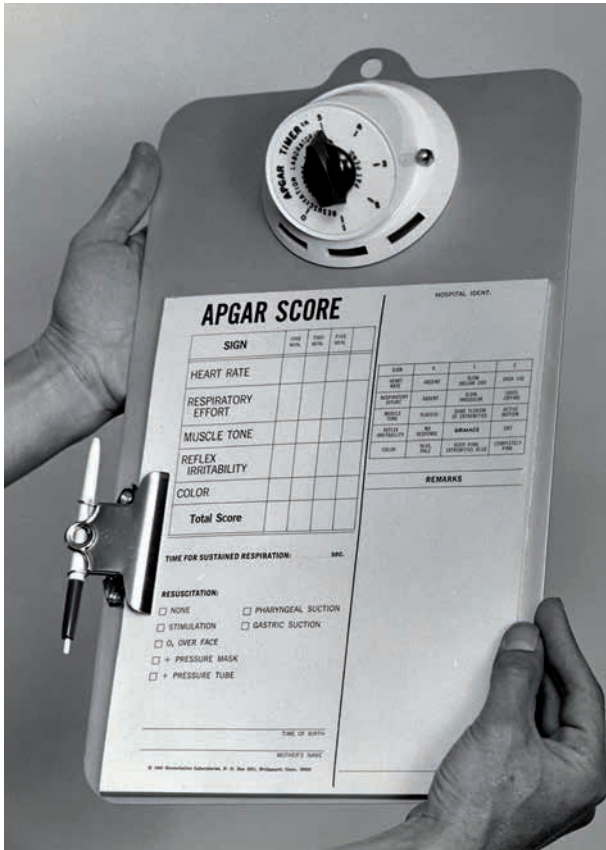


Fig. 1. — The Apgar score

Surgeon Apgar

In 1929, Virginia enrolled at the “Columbia University College of Physicians & Surgeons” in New York. That same year, Wall Street was hit by the stock market crash that would plunge the United States into a harsh economic crisis for years on end. To finance her studies, she came up with all kinds of little chores, like catching cats for the Physiology laboratory to perform experiments on. But that didn’t suffice. She needed to borrow money. In 1933 she graduated as M.D. and ended 4th place on a total of 90 students. A nice result, but in the meantime she had accumulated debt up to 4000\$. Virginia was accepted as a resident in the surgical team of the Columbia Presbyterian Hospital where Allen Whipple (of the renowned pancreatic surgery) was the Head of Department. Despite her dexterity and anatomical knowledge, Whipple discouraged her to pursue a career as a surgeon. He had already educated some female surgeons that had not succeeded. Even for men, it was difficult starting a surgeon’s practice in New York. That’s why he advised her to master the art of Anaesthesia.

Whipple knew very well that the success of an operation is not just dependent on the skills of the surgeon. A competent anaesthetist has an important role as well, as he keeps a close eye on the patient’s



Fig. 2. — Virginia Apgar examining a newborn

pulse rate, blood pressure and respiration. But the title of anaesthetist as such did not exist at the time. Anaesthesia of patients lay in the hands of nurses that were not properly educated for the job. In that day and age, a formal training in Anaesthesia didn’t even exist in New York. After long deliberation, Virginia accepted to explore this unknown territory. Especially after Whipple had confided to her that she had “the energy, intelligence and ability needed to make significant contributions in this area.”

Apgar coccyx

After some investigation, there appeared to be only one training centre for Anaesthesia in all of the United States, the Dr. Ralph Waters’ Department of Anaesthesia at the university of Wisconsin-Madison. Virginia went and studied there for 6 months. Upon her return, she was appointed Head (and only member) of the Department of Anaesthesia at the Columbia Presbyterian Hospital. Colleagues were hard to find, and with good reason. Anaesthetists were not regarded as equals by surgeons, and the salary was correspondingly low. Because Virginia Apgar couldn’t find any anaesthetist colleagues, she started a training in Anaesthesia for students in September 1938. A textbook on Anaesthesia was not available, but together with head nurse Anne Penland she composed one: “Notes on Anaesthesia”. Virginia revealed herself to be a fascinating teacher



Fig. 3. — Dr Apgar giving advice to young mothers

and she made a lasting impression on her students. She unscrupulously named every possible body part, including those in the region of clitoris-labianus. For her classes in spinal Anaesthesia, she used her own coccyx alongside an old skeleton to teach her students points of reference. This rudimentary appendix was placed at an unusual angle in her case, so it posed some extra difficulties. Another important part of the training in Anaesthesia was resuscitation. Virginia learned to apply first aid, both inside and outside the hospital. In her purse, she always carried a pocket knife (for an urgent tracheotomy), an endotracheal tube and a laryngoscope. With her “energy, intelligence and ability” – as professor Whipple had once prophetically claimed – Virginia Apgar single-handedly founded a Department of Anaesthesia, worthy of the name, in 1949. She became the first female fulltime professor at the Columbia University of New York.

Apgar score

It was in this position that she would make her biggest contribution to medical science. From her

experience in the delivery room, she had learned that the first moments after birth are crucial for the newborn. In a time when anaesthesia was still tricky business, physicians focused mainly on the wellbeing of the woman during labour, and were less concerned with the condition of the infant. And even when physicians or midwives were present, they lacked a standardized protocol to accurately evaluate the viability of the baby. Many newborns died because of it. Statistics from those days show that both maternal and neonatal mortality were higher in the United States than compared to Europe. Between 1930 and 1950, this situation gradually improved, but infant mortality rates during the first 24 hours after birth hardly moved. In order to change this, Virginia Apgar came up with the idea of just applying the same standard variables that an anaesthetist would keep an eye on during a surgical procedure: 1/ pulse rate, 2/ respiration, 3/ muscular tone, 4/ reflexes and 5/ skin colour. That is how the Apgar score came to existence. Each of the 5 variables was evaluated with a score from 0 to 2. “0” meant “absent”, “1” meant “ailing” and “2” was “optimal”. The best possible score was 10.

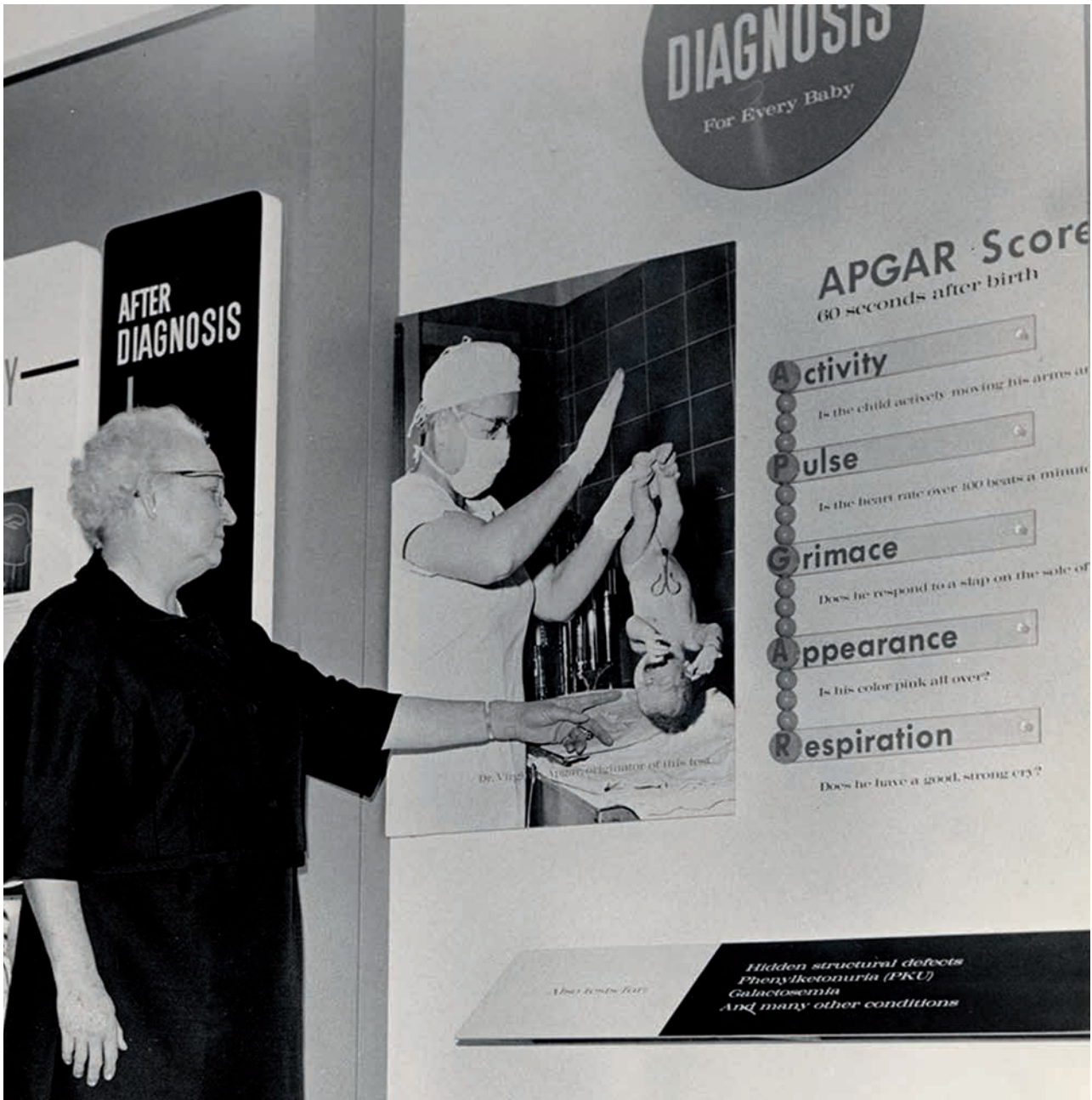


Fig. 4. — Dr Apgar as a teacher

For three years, Virginia Apgar applied her 5-point score system to thousands of deliveries, and she soon realized it was an exceptionally useful test for estimating the viability of a newborn. In 1952, she presented the test at a scientific conference and she subsequently published the results in 1953. From then on, the Apgar score disseminated all over the United States. One year later, it found similar resonance in Europe.

Apgar acronym

In 1961, Victoria Apgar received a letter from a Dr. Joseph Butterfield, professor at the Colorado University in Denver. She had already received

plenty of praiseful notes after her publication, but the Butterfield letter contained something interesting. One of his residents had come up with the idea of connecting the five letters of APGAR to the five points of attention in a newborn.

- A – Appearance (skin colour)
- P – Pulse
- G – Grimace (reflexes to stimuli)
- A – Activity (muscular tone and movement)
- R – Respiration (breathing)

Victoria Apgar loved the idea and adopted the acronym immediately. The only thing she failed to see, was that this five-letter-word would go on to lead a life of its own. And so it did. Today, almost



Fig. 5. — Virginia Apgar was an excellent violin player

nobody realizes that behind the Apgar score is a woman. A woman who was initially deemed too soft for the surgical profession. A woman that, as an anaesthetist, was regarded as inferior to a surgeon and was correspondingly paid less. But a woman that conquered everything with her charismatic personality and generosity, and who eventually earned herself a place in the Parnassus of Medicine.

After the introduction of her score, Virginia Apgar continued to do medical research, among other things in the field of acidosis and other acid-base disturbances in newborns. As it fits a conscientious fundamental researcher, she thereby always questioned her own findings and results. Including the anaesthetics that she used herself routinely. One day, for example, she came to the astounding conclusion that the gas that she had been administering for years, cyclopropane, had a negative effect on the Apgar score. She stopped using it immediately, but not without sighing: “There goes my favourite gas”.

Master of Public Health

In 1958, Virginia took a sabbatical. The reasons for interrupting her 20-year career as a practicing anaesthetist were twofold. On the one hand, she wanted to follow a course in statistics to be able to

transform her scoring system into a database, something the Ministry of Health Care had asked for. On the other hand, she was asked by the “National Foundation for Infantile Paralysis” (founded to eradicate polio from the US) to become the director of a new department, the “Division of Congenital Malformations”. This appealed to her instantly, particularly because she had seen so many hideous malformations throughout her long career. It would give her the opportunity to research the causes for these disorders. One of those causes had recently manifested itself in Europe in a dramatic way. Women, who had taken Thalidomide during pregnancy against nausea and morning sickness, gave birth to babies with stumps instead of arms and legs. Phocomelia. An abomination. Luckily the tranquillizer wasn’t for sale yet in the US because it hadn’t been approved by the Food and Drug Administration. But from that near-miss experience, Virginia learned that any medication during pregnancy or delivery was to be treated with caution, as she had already experienced herself with her favourite aesthetic, cyclopropane.

Apgar book

Her lifelong care for the wellbeing of the pregnant woman and the newborn child resulted in a book: “Is My Baby All Right?”. Herein she gave an overview of conception, pregnancy, birth and all of its possible hazards. She wrote it together with a medical journalist, Joan Beck, and documented it with 25 cases out of her own practice. It became a bestseller. In her function as Master of Public Health and given her years of experience, she was a most welcome guest at many conferences or lectures. With her euphonious voice and eloquence, she became an excellent ambassador for raising funds for the National Foundation. After each lecture, the dollars kept flowing in.

Throughout her life, Virginia Apgar continued to follow the most recent scientific developments closely. When genetics made its entry into the medical world, she was one of the first to appreciate its importance. She read everything there was to read about it and was appointed in 1973 as teacher in “Medical Genetics” at the Johns Hopkins School of Public Health.

Apgar hobbies

Despite her many scientific tasks, Virginia took time for recreation. Just like her father, who had been a jack-of-all-trades, she excelled in numerous side activities. She collected stamps and would later

be honoured with a 20 dollar cent one herself. She loved to garden and bred an Apgar orchid. She also played golf and went fishing regularly. For the latter, she would venture to the most exotic places, like the salmon rivers in Scotland and the Great Barrier Reef. When the first amateur airplanes with propeller shot into the air, she took flying lessons with the aim of one day flying kamikaze under the George Washington bridge. But her greatest hobby remained music. Since her early childhood, she had been playing the violin, and she would continue to do so for the rest of her life. At one moment, she fiddled in three orchestras at the same time, one of which bearing the slightly juvenile name: “The Catgut Acoustical Society”. And to test her dexterity

on something entirely different, in 1956 she built two violins, an alt violin and a cello with a mother who had recently given birth, Carleen Hutchings.

Apgar ending

After a progressive liver condition, Virginia Apgar died on August 7th, 1974 at the age of 65 years. She passed away in the Columbia Presbyterian Medical Center, where she had worked and taught for over twenty years. She didn’t leave a husband or children behind, but her memory lives on in numerous articles in the domain of neonatology and teratology, including many about her meanwhile world-famous Apgar score.