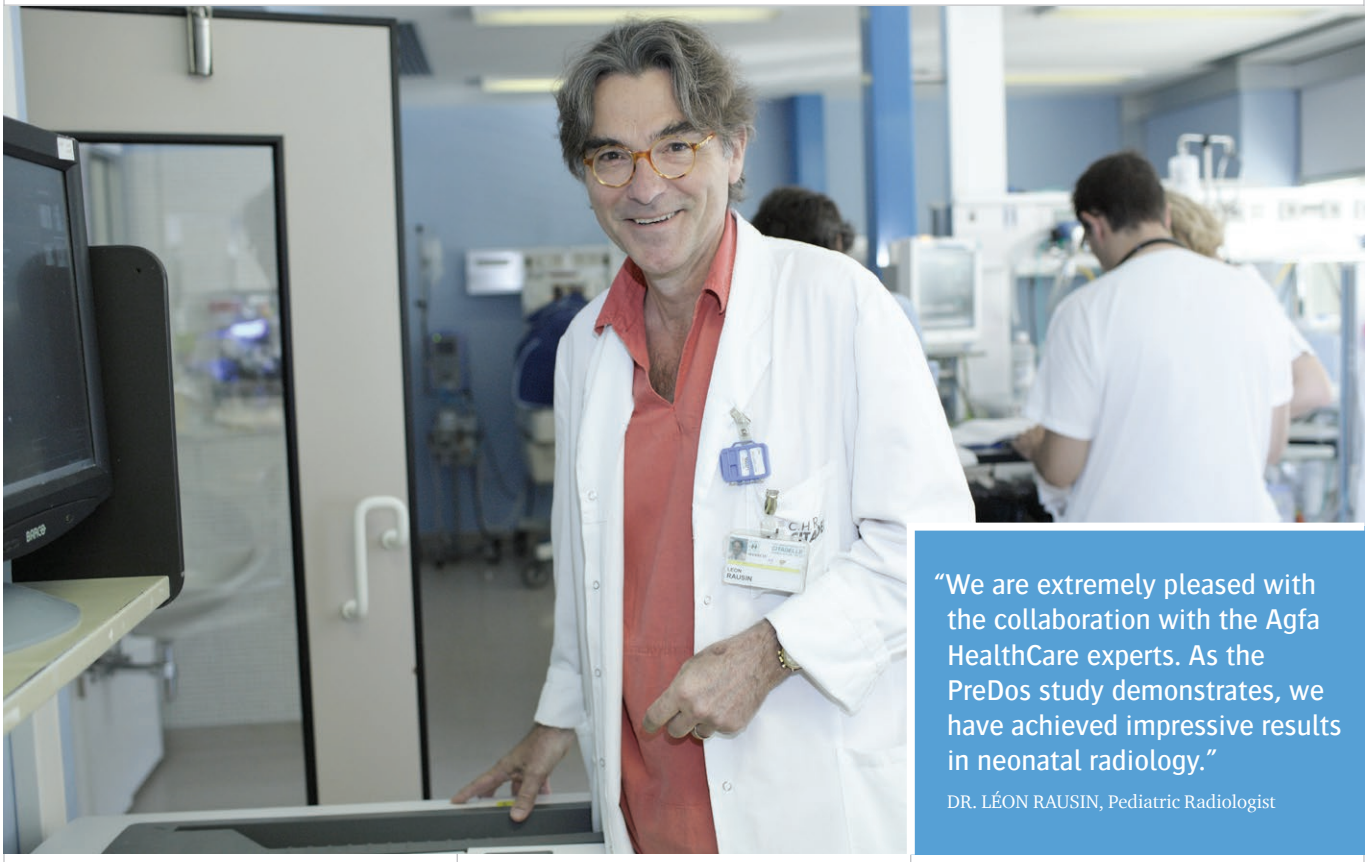
Customer Case: CITADELLE REGIONAL HOSPITAL, LIÈGE, BELGIUM

Reduced radiation dose and fewer exams for neonates

Adherence to ALARA principle and collaboration with Agfa HealthCare leads to better care for babies in Liège

INTERVIEWEE Dr. Léon Rausin, Pediatric Radiologist



"We are extremely pleased with the collaboration with the Agfa HealthCare experts. As the PreDos study demonstrates, we have achieved impressive results in neonatal radiology."

DR. LÉON RAUSIN, Pediatric Radiologist

The Citadelle Regional Hospital's NICU is a top achiever in terms of low radiation dose and reduced number of examinations per neonatal patient, as shown in the Belgian PreDos study[1]. Driven by a passion for neonatal radiology, Dr. Leon Rausin, Dr. Paul Jamblin and their team worked closely with neonatologists and Agfa HealthCare experts to bring the hospital's philosophy and systems in line with the ALARA principle.

In Neonatal Intensive Care Units (NICUs), diagnostic radiology is key to effective diagnosis and treatment of premature babies. The PreDos study, conducted by Belgian nuclear control and nuclear energy agencies FANC-AFCN (Federal Agency for Nuclear Control) and SCK-CEN (Study Center for Nuclear Energy), examined the radiology doses delivered to 285 premature babies born before 37 weeks of gestation in NICUs across Belgium, who were administered a combined total of 830 examinations during their hospital stays.

The study measured tube output for every contributing X-ray system in the participating hospitals, and for each of the patients the number of examinations was extracted from the facilities' PACS systems. According to the report, a wide variation of estimated doses was observed across the hospitals, caused by factors including a wide variation in examination settings, significant variance in focus-detector distance and a large variation in tube output for the different X-ray machines.

CITADELLE REGIONAL HOSPITAL: LOWEST RADIATION DOSE OF ALL PARTICIPATING CENTERS IN PREDOS STUDY

The Citadelle Regional Hospital has 25 beds in its NICU, and takes care of 480 neonatal patients per year. The pediatric department has 100 beds, treats approximately 4,800 patients per year, performs 30,000 day clinic consultations

SOLUTION

DX-S Computed Radiography solution

» Offers reduced X-ray dose and improved pediatric imaging
» Features the integration of NIP (needle-based imaging plate system) and Scanhead technologies, providing high levels of image quality, speed and flexibility
» MUSICA² image processing software, for a simplified workflow that analyzes the image and automatically applies the appropriate image enhancement parameters independent of the examination

AGFA HEALTHCARE'S CONTRIBUTION

» Calibrate the CR solution with NIP (needle-based imaging plate system) and MUSICA² image processing software in line with the needs of neonatal radiology.
» Work closely together with the neonatal radiologists to adhere to the ALARA principle for neonatal patients.

"In addition to the use of diagnostic reference levels, we also need to keep our staff focused."

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and has another 16,000 emergency room visits annually. Pediatric radiologists Dr. Leon Rausin and Dr. Paul Jamblin, and their team, whose cohort was one of the largest in the study, showed the lowest radiation dose of all participating centers. They were also among the best-performing centers in terms of the number of examinations administered to each patient.

COLLABORATION WITH AGFA HEALTHCARE SPECIALISTS CONTRIBUTES TO CALIBER OF PREDOS STUDY RESULTS

The explanation for this success starts with the passion of Dr. Rausin for pediatric radiology and in particular neonatal radiology. "The reduction of pediatric radiation dose is the biggest challenge facing pediatric radiologists today," he says. "A European study from 1997, in which we also participated, showed a radiation dose variation in different European centers of a factor of 70. This was unacceptable, particularly since premature babies as a rule used to get two to three exams per day."

"The Agfa HealthCare CR solution with NIP (needle-based imaging plate system) and MUSICA² image processing software is very effective in terms of dose reduction."

DR. LÉON RAUSIN, Pediatric Radiologist

Dr. Rausin was compelled to find ways to reduce the patient dose. He began working with his colleagues and with Agfa HealthCare experts to pinpoint the optimum balance between radiation dose and image quality. "The Agfa HealthCare CR solution with NIP (needle-based imaging plate system) and MUSICA² image processing software is very effective in terms of dose reduction.
Even so, we had to work several weeks to fine-tune the image processing algorithms and the examination parameters for neonatology. Agfa HealthCare has now integrated our findings into its solutions. I am extremely pleased with the collaboration with the Agfa HealthCare experts. As the PreDos study demonstrates, we have achieved impressive results in neonatal radiology."

INVOLVING STAFF AS IMPORTANT AS SETTING THE RIGHT TECHNICAL PARAMETERS

The goal of the PreDos study was to calculate national diagnostic reference levels, explains Dr. Rausin, so that all hospitals can strive to be in the lowest quartile of radiation dose administered. The aim is to harmonize and implement best practices across NICUs in Belgium.

Although the study recommendations that Dr. Rausin and Dr. Jamblin plan to implement focus mainly on technical settings, they realize that the issue is broader than the technical aspects alone. All staff involved in the imaging process should take an active part in the optimization procedure, says Dr. Rausin. "We found out during the study that our technologists were exceeding the kVp settings determined in the study protocol by 5 kVp. We have had them adjust this, but it proves that in addition to the use of diagnostic reference levels, we also need to keep our staff focused."

NEONATOLOGISTS' SUPPORT OF ALARA PRINCIPLE KEY TO DOSE REDUCTION

The PreDos study also showed a large variation in the number of examinations performed on patients during their NICU stay. The Citadelle team did well on this criterion too. "We only examine when we suspect a complication," says Dr. Rausin. "We decided to stop the 'obligatory' examinations that would occur twice, or sometimes even three times a day. We managed to convince our neonatologists to accept the ALARA approach – as low a radiation dose as reasonably achievable. They monitor the patient with biological parameters, and if these do not sufficiently explain a patient's condition, we of course will examine." •

[1]Jérémie Dabin, Lara Struelens, Filip Vanhavere, Evaluation of the doses delivered to premature babies in the Belgian Neonatal Intensive Care Units (PreDos Project), FANC-AFCN (Federal Agency for Nuclear Control) and SCK-CEN (Study Center for Nuclear Energy), 2012.

DID YOU KNOW...

» The PreDos study shows neonate patients may receive a radiation dose up to 70 times during a typical stay in a NICU center.
» The first official ICU for neonates was established in 1961 at Vanderbilt University, US.

AGFA HealthCare