



2021

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Hai Yun (Helen) Gao

Rutgers University New Brunswick

Recommended Citation

Gao, Helen (2021) "From Amusement Parks to Hospitals: Evolution of the Neonatal Care Setting in the US," *The Macksey Journal*: Vol. 2, Article 155.

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From Amusement Parks to Hospitals: Evolution of the Neonatal Care Setting in the US

Helen Gao

Rutgers University New Brunswick

Abstract

How did care for premature babies evolve from exhibitions at amusement parks to NICU's in hospitals? In the early 1900s in the US, pre-term babies fought respiratory problems, hypothermia, and many other illnesses at home. Meanwhile in France, doctors adapted chicken incubators to give human babies warm, filtered air to sustain their lives. Dr. Martin Couney imported the incubator idea from France to the US and spread their wonders in exhibitions called "Infantoriums" or "Baby Incubators" in amusement parks. While these exhibits boomed in popularity, their histories reveal that without neonatal care as an official medical specialty, the care of premature babies was sidelined. As the field of neonatal care became professionalized, the medical community began to create specialized neonatal intensive care units (NICUs) with extensive technology, modern equipment and purpose-built spaces to accommodate babies, their parents, and professional staff. This project will explore the history of incubator exhibits in amusement parks of the early 20th century through newspaper articles and medical publications. This research concludes that incubator baby exhibits, although controversial, called attention to the plight of parents and premature infants. When

neonatology moved into the hospital, the spaces for caring for these small patients changed drastically, based on evidence-based practices.

Keywords: Art history, medicine, healthcare, public health, architecture, hospital, design

Introduction: The Attitude Towards Premature Babies

At the advent of the twentieth century, the field of neonatology was non-existent in the US, intersecting with the height of the eugenics movement. This widespread movement amongst the public and the medical community perpetuated the idea that to improve the human population's genetic quality, those with inferior physical and mental qualities should be excluded while those with superior qualities should be promoted. People believed that premature babies were “weaklings” and “failures of nature” that should be left to die, as they would not contribute to or improve society.¹ Prominent physicians, such as Dr. George Newman, labeled babies with conditions such as atrophy, prematurity, and other congenital birth defects as “not so much diseased as merely unfit, and either not ready or not equipped for a separate existence.”² Thus, the primary care setting for premature babies was at home, where mothers would birth and take care of newborns until they died without medical intervention.

The sociocultural context surrounding childbirth in France in the early 1900s contrasted greatly with the United States. French politicians were concerned with the country's falling

¹ Kattwinkel, Susan. "Monstrosity or Medical Miracle?" 197.

² Newman, George. *Infant mortality: a social problem*. 47.

birth rate, which was only half of their rival Germany's birth rate. Politicians considered this statistic to be a negative reflection of their country, and they also thought that women were failing in fulfilling their patriotic duty of raising sufficient children.³ While the underlying concern for premature infant mortality rate was political rather than humanitarian, France nevertheless became a forerunner in caring for premature babies. Inspired by incubators used to hatch chickens, French obstetrician Stéphane Tarnier invented an incubator to keep human babies warm.⁴ This technology significantly dropped infant mortality rates, and the growing French infant mortality campaign fueled the adoption of incubators by hospitals specifically designed to treat premature babies.

While France was making premature infant mortality rates a political issue, the United States harbored no concerns for their premature infants until a Polish immigrant named Dr. Martin Couney took France's incubator idea to the United States. He wanted to promote and spread knowledge about these incubators' medical wonders through "Infantoriums" or "Infant Incubators." In 1903, Couney established his long-running installation in Dreamland Park of Coney Island (see Figure 1). He also exhibited incubators temporarily at the World's Fair in Chicago in 1933 and New York in 1939, which were expositions that showcased achievements of various nations for a few months to a year.⁵ Couney did not charge parents a single penny for caring for the babies, even though it cost about \$15 a day to care for each baby.⁶ Some considered Couney as a quack doctor for attempting to save the "genetically undesired." Some bought into the intrigue of sensationalizing the freakish, tiny nature of the babies. But

³ Baker, Jeffrey. "The incubator and the medical discovery of the premature infant." 323.

⁴ Baker, Jeffrey. "The incubator and the medical discovery of the premature infant." 322.

⁵ Philip, Alistair GS. "The evolution of neonatology." *Pediatric research* 58, no. 4 (2005): 800.

⁶ Smith, Mary Dabney. "Incubator Babies." *The American Journal of Nursing* 11, no. 10 (1911): 792.

ultimately, he demonstrated that his techniques were successful, and his incubator exhibits became foundational examples that transitioned into hospital-based premature infant nurseries into modern NICUs.

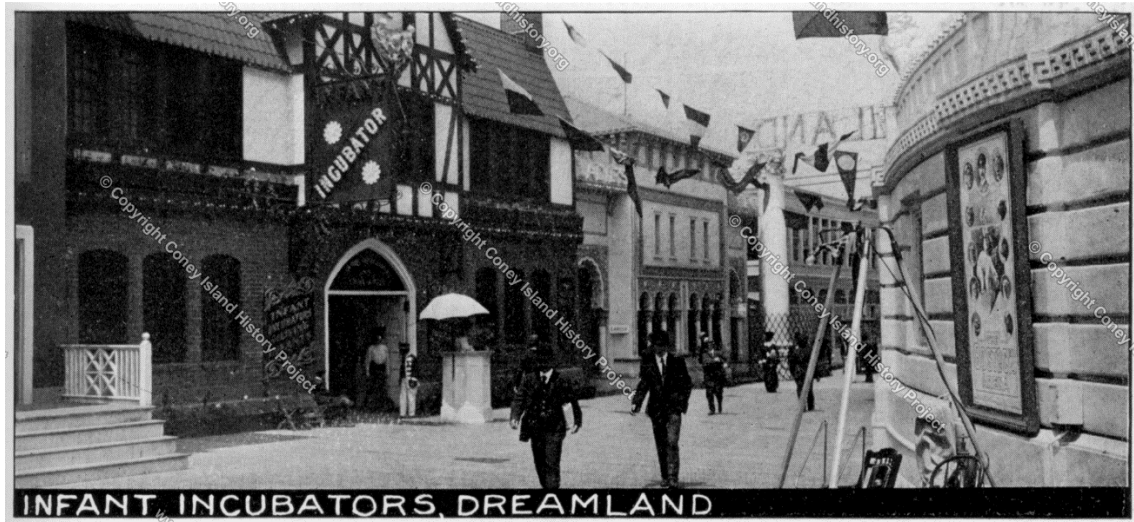


Fig. 1. Infant Incubators in Dreamland. From page 73 of *Coney Island - The People's Playground: A Souvenir Picture Book*.

Medical Wonders: The Incubator Exhibits

The incubators at Couney's exhibits demonstrated exemplary hygienic and systematic procedures. Each incubator was a 5 feet tall box made with steel and a glass front. A hot water bath under the bed radiated warm air, and thermostats inside the incubators regulated temperatures so that the incubator would maintain a warm environment for the baby.⁷ A pipe connected the incubator to the outside so fresh air from the outside would first pass through a ball of absorbent wool soaked in antiseptic water and then a ball of dry wool. The babies were constantly breathing in refreshed air while on exhibit, and they stayed in the incubators all days except for when they were fed every two hours. Lastly, a chimney-like device would vent out

⁷ Smith, Mary Dabney. "Incubator Babies," 792.

exhausted air (see Figure 2). Figure 2 shows Dr. Martin Couney holding a boy whose life he saved in an incubator and Hildegarde Couney, his daughter and chief assistant at his exhibitions. They peek into an incubator. One can also see that another incubator is set a couple of feet apart to the left of the incubator in the picture, and this was to separate infants such that each one had their individual incubators. In the American Journal of Nursing, Smith states that the nurses kept incubators as clean as possible in the exhibits by wiping them with a 70% alcohol solution every day.⁸ Not only did the incubator's glass windows give visitors a clear view, but its design also allowed technological advances that kept premature babies alive. Spacing the incubators out, giving each infant an individual incubator, and keeping sterile protocols was essential in caring for the tiny babies.



Fig. 2. Martin Couney, boy, and Hildegarde Couney looking at baby incubator.

⁸ Smith, Mary Dabney. "Incubator Babies," 793.

Couney and his staff provided round-the-clock care for premature infants for weeks or months. In the pre-antibiotic era of the early 1900s, infection was a great fear, which is reflected in the exhibits' procedures and architecture. Once the parent gave the baby to Couney, he would not allow the mothers to touch the infants, as having more people around would expose the babies to more sources of possible infection.⁹ Thus, the premature babies would drink breastmilk directly from the wet nurses that Couney hired or from bottles filled with the wet nurses' breastmilk to receive breastmilk. The nurses sanitized bottle tips with boric acid after each use. Furthermore, Couney did not allow wet nurses to smoke, consume unhealthy foods like hamburgers, or drink alcohol so that their breastmilk would be of high quality.¹⁰ Another precaution to prevent infection included a guard-rail that prevented visitors, including the babies' mothers, from getting too close. This guard rail is visible in Figure 3 and partially visible in Figure 2. At Coney Island, Couney would return the babies to their mothers once they had stabilized, but at the more temporary World Fair exhibits, he would return the babies to the parents either when they had stabilized or when the season ended after a few months, whichever came first.¹¹ Although a few doctors in the medical community published advice on conditions needed to allow babies to breathe on their own and parameters that defined a healthy weight, there were no national guidelines or medical community that set standards on this practice.¹² Because the field of neonatology was still not professionalized, the physicians under Couney's staff decided whether the baby had stabilized. Thus, as a pioneer of

⁹ Davis, et al. "Mothers' Involvement in Caring for Their Premature Infants: An Historical Overview." 42, no. 6 (2003): 580.

¹⁰ Smith, Mary Dabney. "Incubator Babies," 794.

¹¹ "BABY INCUBATORS AT THE PAN-AMERICAN EXPOSITION." *Scientific American* 85, no. 5 (1901): 68.

¹² Dunham, Ethel C., and Jessie M. Bierman. "The Care of the Premature Infant," 851.

the principles of care for premature infants, Couney emphasized the principles of sterility at the expense of increased separation between mothers and babies.

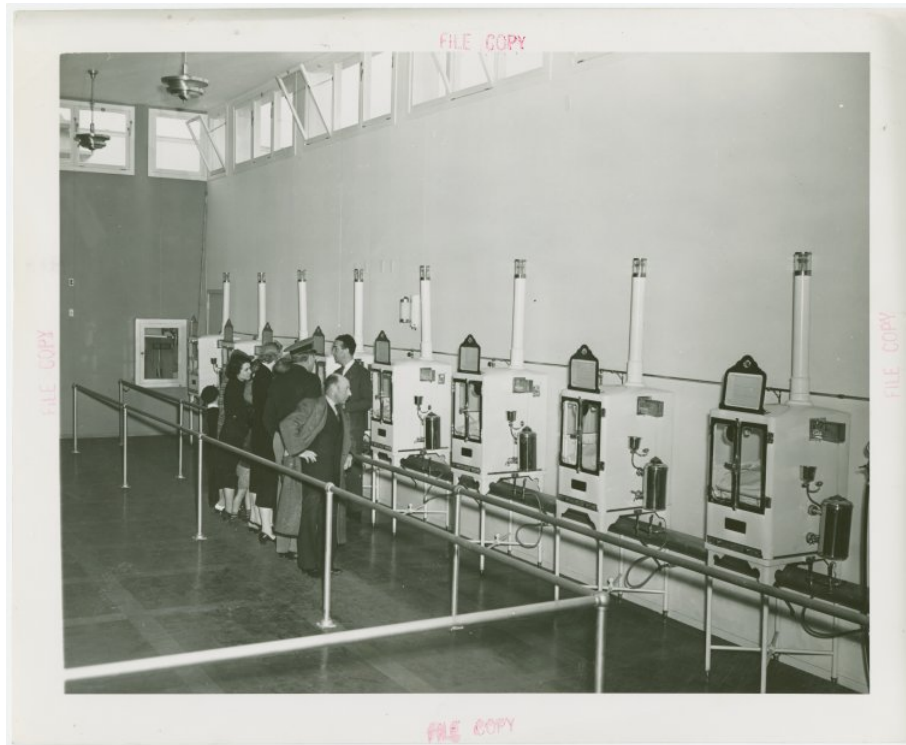


Fig. 3. Men and women looking at babies in incubators at the exhibit. From The New York Public Library Digital Collections.

Transitioning Care

In 1911, Dreamland Park in Coney Island experienced a fire that burned down the entire Infantorium, marking a pivotal transition in attitudes towards incubator shows that would lead to care for premature babies in more formal settings. While Couney's babies were all saved from the fire, the public and medical community realized the dangers of caring for premature infants in amusement parks. One New York Times article states, "That the infants who were on exhibition in the Dreamland incubators were not sacrificed in the fire which destroyed that

resort is a mere chance.”¹³ After this incident, the president of the New York Society for the Prevention of Cruelty to Children declared that premature infant care should only happen in hospitals.¹⁴ However, transitioning from exhibitions to hospital settings was easier said than done, especially as the neonatology was still not recognized as a specialized medical field.

In the 1920s, hospitals began to take responsibility in taking care of infants. But most local hospitals could not afford to have their premature infant care units, as medical procedures required specialized equipment with high costs.¹⁵ Thus, NICUs were in regional medical centers rather than in local hospitals. If a baby were born prematurely, the mom would stay at the local hospital while the medical staff transported baby to NICUs for treatment. The unintended consequences meant further separation between the baby and the mother. In an article in the New York Times, a nurse commented that “Hospitals couldn’t spare nurses to sit all day and all night with a single child too fragile to suckle.”¹⁶ The high cost of individual incubators also led regional medical centers to have one big room that was kept warm instead. The giant incubator had sufficient room for two or more infant beds and a wash area to feed and bathe them. Between the cells and the nursery room, an antechamber prevented the infant from cold air when a nurse opened the door (see Figure 4). However, there were also many disadvantages. Staff would be uncomfortable when they would have to stay in the heated room for a long time. More importantly, it was challenging to individualize care for premature infants of various ages and sizes with different health needs. One can see that the architectural design still reflected the fear of cross-infection. Parents were sometimes allowed to watch through the

¹³ "A New Coney Island Rises from the Ashes of the Old..." New York Times (1857-1922), May 08 1904, 1.

¹⁴ "A New Coney Island Rises from the Ashes of the Old..." New York Times (1857-1922), May 08 1904, 1.

¹⁵ Hess, Julius H. Premature and congenitally diseased infants. Lea & Febiger, 1922.

¹⁶ "'Incubator Babies' Claiming Special Care of the City: A Premature--but Thriving--Baby." 1.

windows of the unit, but strict nursing protocols called for constant hand-washing and minimal handling of babies. The absence of neonatology as a medical specialty stalled the development of specialized premature infant care units in hospitals. As such, Couney's exhibits continued to support the care for premature babies and garner much success.

While Coney Island's Dreamland Park housed Couney's long-running incubator baby exhibit from 1903 to 1943, his showmanship led to a unique exhibition at the Chicago World's Fair from 1933-1934. Unlike his usual set up in the Coney Island Infantorium, Couney tailored this exhibit to be a unique combination of education and entertainment. Instead of organizing separate incubators in a line, this space housed fifteen babies in a "semi-circular row in front of plate glass windows set at an angle so visitors can walk through and see the youngsters practically from all sides."¹⁷ The Chicago Tribune also advertised the space to be able to accommodate large crowds of up to 3000 people per hour. In addition to the exhibit itself, a separate "museum and pictures" area (see Figure 5) allowed for a theatre with 100 seats where Couney and his team showed moving pictures showing how to care for babies. Additionally, it housed a "Mother's aid shop" where parents could buy all sorts of items for their babies, such as diapers, blankets, feeding bottles, and more. The "personal area" on the right of the exhibit housed rooms for wet nurses, baths, and lockers to stay on site. This multifunctional architectural space educated the general public on premature infant care while satisfying the public's fascination with premature infants.

¹⁷ "Babies, Babies, and Babies at World's Fair." Chicago Sunday Tribune. June 5, 1932.

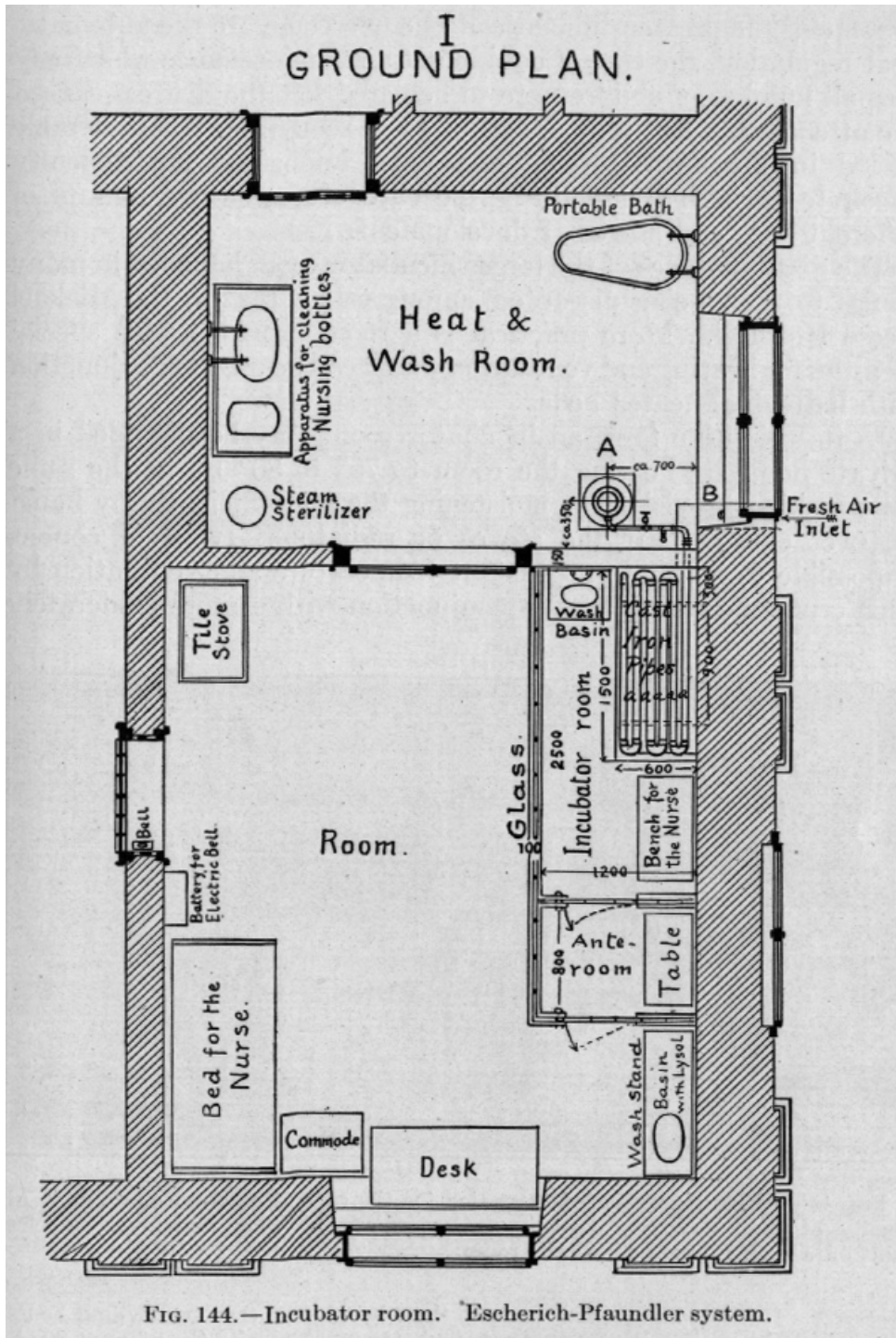


Fig. 4. Early incubator rooms in medical centers of the 1920s.

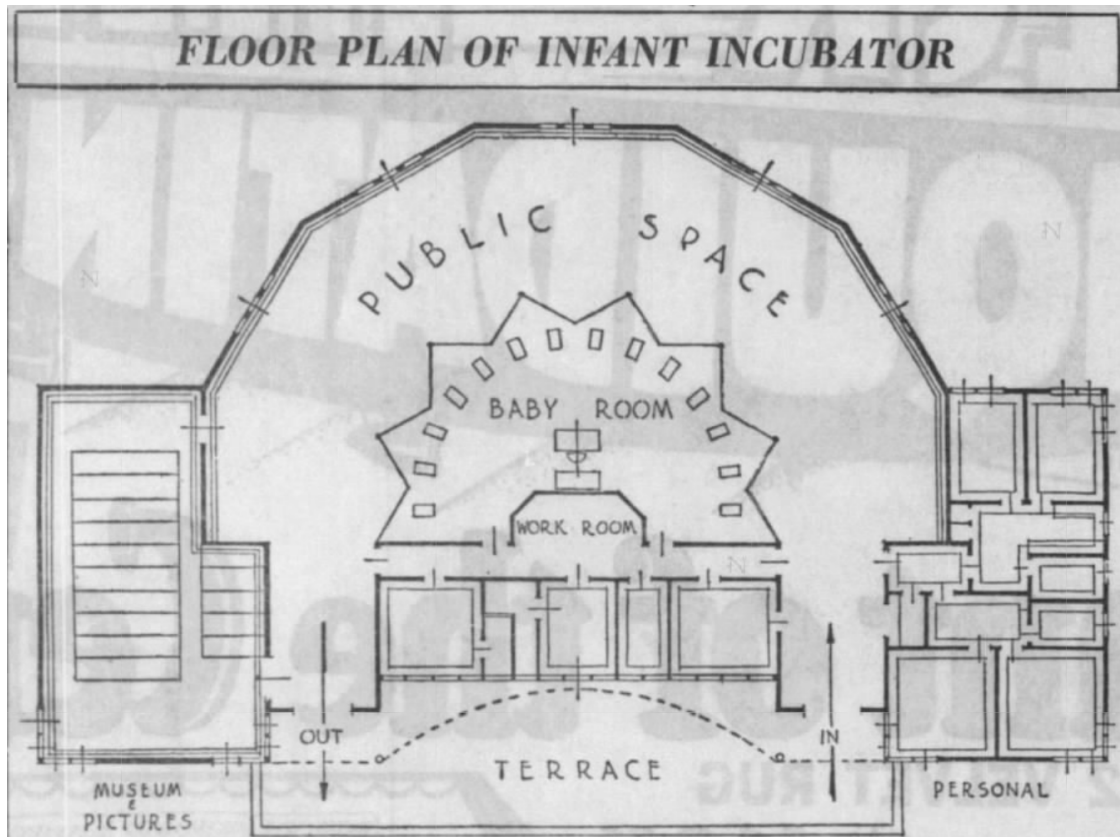


Fig. 5. Floor Plan of the Infant Incubator at Chicago World's Fair in 1933.

Couney emphasized the success of his techniques at the World's Fair and through hosting reunions for premature babies that survived. At the New York World's Fair six years after the Chicago World's Fair in 1940, forty-one babies, most of whom were one years old, and their mothers gathered to celebrate the success of Dr. Couney over a lunch (see Figure 6). Many newspaper articles published about Couney's exhibit's success, sensationalizing the wonders of the infants' beginnings in incubators. One such article excitingly states, "no one was quite sure whether the 'old grads' recognized the scene of their incubator curricula, although their occasional howls sounded very much like the reunion shouts of college alumni..."¹⁸ Eventually,

¹⁸ "Incubator's Class of '39 Lifts Cups to Old Times." 1940.

the operating expenses after years of running the show outcompeted the money Couney earned from admission fees. In 1943, his exhibits permanently shut down.



Fig. 6. A group of mothers with babies who graduated from incubators reuniting in the 1939 World's Fair.

The Pivotal Shift and Modern NICUs

The 1950s and 1960s marked the invention of antibiotics and the official recognition of neonatology as a medical specialty. Subsequently, neonatal care units modified their designs in accordance with the professionalization of premature infant care. Instead of building large incubator rooms in earlier hospitals of the 1920s, hospitals reverted to using separate incubators for individual babies housed in one large room (see Figure 7). With new techniques to assist in breathing, feeding, and detecting physiological issues, the unit also expanded and

compartmentalized itself into areas based on the level of severity of an infant’s condition.¹⁹ For example, the top left area would be for more mature babies, while the bottom right corner housed babies that needed critical care. However, the medical community still believed that parents were a source of infection and must be excluded from the care of premature infants.²⁰ This belief continued into the 1970s, as hospital policy only allowed parents to enter the nursery when the infant was about to be discharged, if at all.

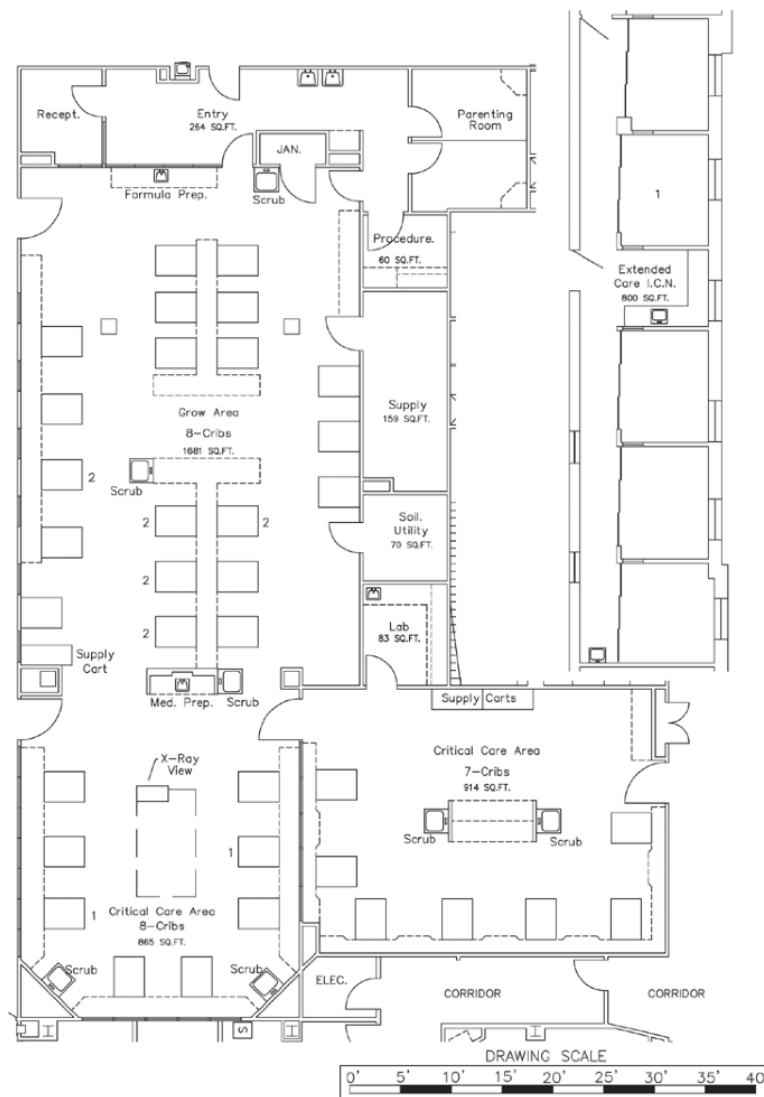


Fig. 7. Neonatal care units of the 1950s and 1960s.

¹⁹ Stevens, et al. “The impact of architectural design upon the environmental sound and light exposure of neonates who require intensive care.”

²⁰ Goldberg, S., and B. Di Vitto. "Handbook of parenting. Vol. 1: Children and parenting." (2002).

Eventually, growing evidence showed that touch and bonding between mother and baby is vital to their development, and this shift in scientific thought reflected itself in architectural design. While searching for different solutions in improving care for premature infants, Barnett and colleagues from Stanford University Medical Center published a pivotal study in 1970.²¹ They showed that lack of contact between premature infants and their mothers caused severe deprivation not only during the postpartum period but also negative motor and mental development of the infants. Additional studies supported a positive long-term implication of mother-baby contact: mothers increased their confidence in their caretaking skills.

Consequently, NICUs became significantly more “parent-friendly,” encouraging maximum involvement with the babies. Medical staff encouraged cuddling and skin-to-skin contact, also known as Kangaroo care, between mothers and their premature infants. Advancements in technology only barred the most critically ill babies from receiving maternal touch, but mother-baby contact was encouraged once their conditions improved. Furthermore, studies showing that light and sound exposure in large NICUs could adversely affect physiological conditions of premature infants,²² and private rooms significantly reduced their exposure to both sound and light. Growing scientific evidence thus pushed the architecture of NICUs to evolve into mostly single-family rooms.

The modern NICU developed in 1980 contain multiple private rooms, some equipped for twins and others equipped for triplets. Private rooms not only promote family-bonding but

²¹ Barnett, Clivord R., P. Herbert Leiderman, Rose Grobstein, and Marshall Klaus. "Neonatal separation: The maternal side of interactional deprivation." *Pediatrics* 45, no. 2 (1970): 197.

²² Stevens, et al. "The impact of architectural..."

more importantly, allowed individualized care based on each baby's needs. This eliminated the problem that large incubator rooms in the early 1920s caused. The walls contain insulation material to block out sound (see Figure 8). Because the NICU also seems like a foreign environment to new parents, architects designed rooms to resemble nurseries. This plan includes features like a folding couch, a wardrobe, desk and chair for the family in the back area of the room. A recliner directly sits across from the baby so that the parents can see and feel close to their child (see Figure 9). A curtain separates the family area in the back from the baby as well as the nurse's station from the baby. This allows the light to be adjusted in the infant's room such that the light levels are kept low even when the nurse needed to work. These shifts in hospital design demonstrate the idea that form truly follows function.

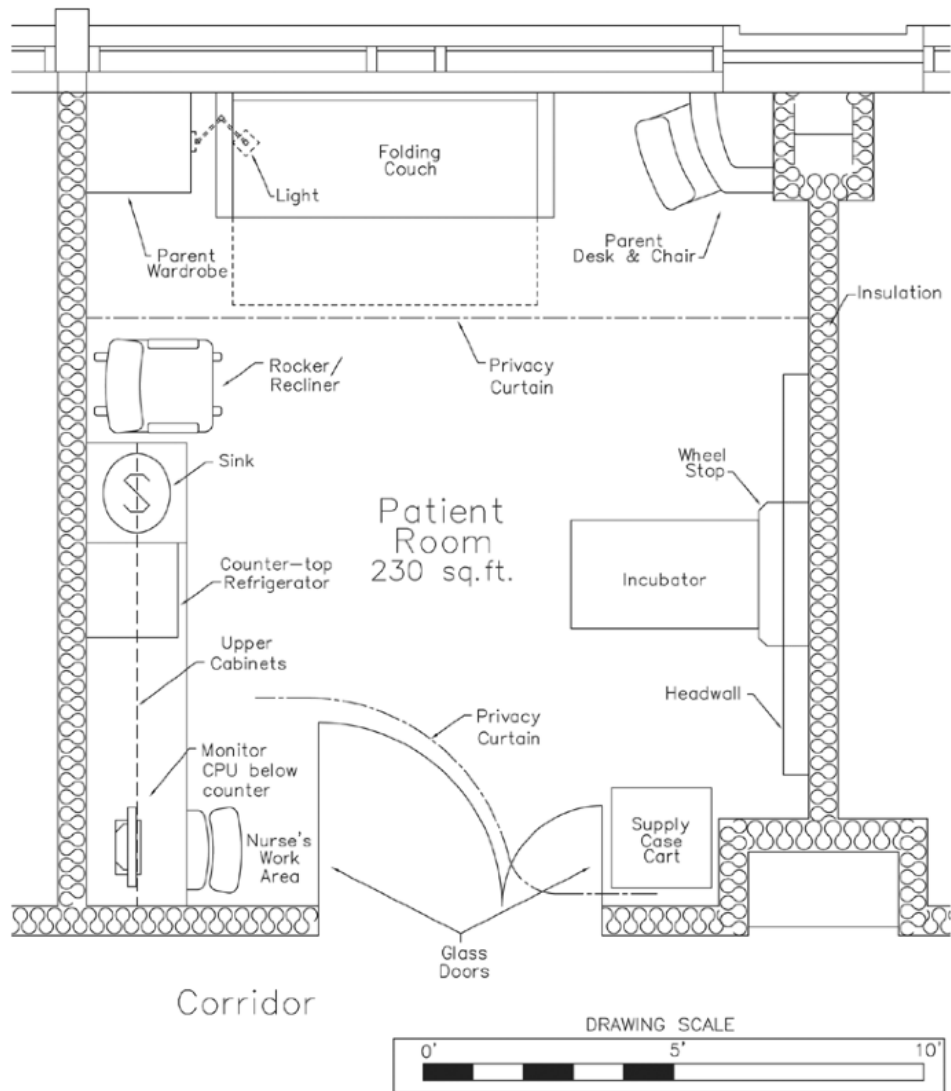


Fig. 8. Floor plan of a modern private room in the neonatal intensive care unit.



Fig. 9. Top: This is a photograph of a private room in the NICU showing the same plan as Figure 7 in a real-life view. Bottom: The individual baby incubator against a wall with ventilating equipment and medical supplies.

Conclusion

While incubator exhibits generated much controversy, Dr. Martin Couney put a spotlight on the issue of premature infant mortality. His popularizing of baby incubators at exhibitions of amusement parks ultimately led to NICU's in hospitals, as the scientific community evolved. Couney's example of incubator exhibits, especially his principles of cleanliness, inspired architecture of early NICUs. As neonatology became a recognized medical field, the architecture eventually evolved to support advanced technology and new scientific evidence. The controversial start of baby incubators nonetheless saved many premature babies that were considered inferior at the time. Couney's success in saving those babies brought attention and awareness to an area of healthcare that did not exist. Today, we realize the potential of the

field of neonatology, and that is reflected in the architecture of the hospital units made for premature babies.

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