Development of a *Biometric Infant Identification Tool:* A New Safeguard through Innovation

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The Joint Commission (TJC) and other organizations recognize the important role and necessity for infant-mother and child identification programs. Hospitals worldwide have infant security policies incorporating both biometric identification and security safety devices.

This paper describes a new biometric safety tool for parents of newborn and adopted infants. The Infant Identifier captures the infant's saliva for DNA testing and scent recognition on one end and the mother's thumbprint/fingerprint on dual end of a thermoplastic wafer. This concept will biometrically link the infant and mother in one biometric tool. It remains with the parents for safekeeping in the hopes that it will never be needed.

The Joint Commission (TJC), the American Academy of Pediatric Dentistry (AAPD), and countless other hospitals and organizations recognize the important role and necessity for infant-mother and child identification programs.[1,2,3] These organizations encourage practitioners and hospitals to implement practices that can aid in the identification of unknown infants and children. Hospitals worldwide have infant security policies incorporating both biometric identification and security safety devices. Disturbing trends have recently been reported in the increase of non-family infant abductions from non-health-care facilities. In fact, infant abductions from private homes and public places have increased two to three times respectively, between 1983 and 2006 study periods.[4]

The concept of using Toothprints® bite impressions on infants and toddlers was popularized at a Masonic CHIP (Child Identification Program) event in 2000 in Boston, Massachusetts to capture DNA and the scent of the saliva for younger infant siblings without erupted teeth. The thermoplastic bite impression wafer records the imprintable dental characteristics of a child, as well as saliva for DNA testing and scent dog tracking.[5] Due to the lack of an infant identification tool that provided the same type of biological sample material, hospitals continued to use Toothprints® on newborns as an additional measure of comfort and security for parents.

With the development of the Infant ***'Identi'***fier™, practitioners now have a means to collect, store, and save samples of salivary DNA and scent of an infant from a simple thermoplastic device. The Infant ***Identi'***fier™ is specifically designed to capture shedding cheek cells containing DNA and also to capture the infant's unique scent of saliva. This uniqueness of the saliva is generated from highly complex volatile organic compounds mixing with bacteria in the mouth resulting in recognizable patterns. Interestingly, under

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test conditions, 52.2% of mothers were able to recognize their babies by the scent alone.[6]

The hospital staff is trained to capture a salivary DNA and scent sample in a 3 second "saliva swipe" with this "thermoplastic swab". In the presence of the parents, the tiny wafer is swiped inside the oral mucosa of a new born in the first hours of life by a nurse or doctor. (Figure 1) The Infant ***Identi'***fier™ also provides the mother's thumbprint/fingerprint on the dual end of the identifier swab. This imprinted 3-D fingerprint provides for reliable maternal identification. (Figure 2) ***This will link the mother and infant in one, unique biometric tool***.

A nurse uses the small thermoplastic "swab" to capture saliva for DNA testing and scent dog recognition.

The dual end of the thermoplastic wafer casts the mother's thumbprint and fingerprint.

The parents are given the Infant ***Identi'***fier™ in a double sealed security bag and instructed to keep the bag in a safe place with hopes that it will never need to be used. In the event of an infant confusion, or worst yet abduction (most recently reported in Sanford, Florida and Nashville, Tennessee hospitals)[7,8]; parents would be able to provide authorities with an uncontaminated scent device for scent dog tracking along with their infant's DNA. According to police canine officers9, scent of human saliva, which remains on the Infant ***Identi'***fier™, is the scent article of choice for scent discriminating canines to track a missing infant or child. The ability of bloodhounds to effectively match a collected scent to the correct person; and then follow that person through and across numerous environments to an effective conclusion, is well known. Test tracking has shown universal success when using the saliva sample captured on the Toothprints® grade thermoplastic with the mother's thumbprint cast on the other end. ("Testing the Viability of Using the Infant Identifier as Scent Material for Trailing Kidnapped Infants"; a non-published report, Public Safety Dogs, Inc. North Carolina, March 17, 2008; Craig, M, Dunn, L et al.).

These thermoplastic wafers have been shown to store sufficient DNA and saliva scent for up to 3 years, thereby providing a means for scent dog tracking and positive identification[10]. When the child turns 3 years old he/she should have had their first dental check-up. At that time the child will have a dental record completed and can have a Toothprint® bite impression taken. This will collect and store his/her DNA and scent while recording dental characteristics unique to every child. Even identical twins have different bite impressions.[11]

The TJC Standards also address the real concern that hospitals face with infant abduction, security, release to wrong families and mother-infant identification.[9,12]

- Although between 1991 and 1995 there was a reduction in abductions from healthcare facilities, there has been an increase in infant abductions from public and private places.
- From 1983-1999 NCMEC (National Center for Missing and Exploited Children) reported 104 abductions from healthcare facilities.

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- Discharge to the wrong family occurs in both urban and rural settings. The primary cause is improper identification of the infant and mother. Other cases are due to deliberate switching of name bands in paternity cases.
- All hospital personnel should be competent in infant-mother identification procedures.
- Organizations must have a formal policy and procedure for proper infant identification.

In fact, concerns such as these have led The Joint Commission to identify the #1 2008 National Patient Safety Goal as: *"Improve the accuracy of patient identification"*.

In 1994, Michael Stapleton, a special agent in the Federal Bureau of Investigation's San Francisco Division, stated that the FBI continued to advocate and encourage foot-printing infants at birth; as it represents a reliable, expeditious and cost effective method for establishing probable personal identity. He suggested including the fingerprint of the mother on the infants footprint document, as it links the infant to the mother. In recent years, however, the print media, and scientific journals have questioned the reliability and expressed the opinion that hospitals waste time and money by foot-printing newborns.[13]

> *"Biometrics are a natural solution for confirming and linking the identity of mothers and their children...there has been public support in areas where (biometrics) has been implemented, as people perceive the benefits….it is a tool in the technology toolbox"*
>
> *—John Vacca 2007 14*

Reasons to use the Infant '*Identi*'fier™:

1. It provides parents with an extra measure of security for their new baby.
2. It provides authorities with an uncontaminated scent sample (saliva) for tracking a missing infant/child.
3. It provides parents the "peace of mind" knowing that they now have a means of proving (from the DNA collected on the Infant ***Identi'***fier™) that the newborn that has just birthed is the child that they will raise as their own child. This will lessen the fear of "switched at birth" scenario for parents.
4. It provides authorities with a means of positively identifying or confirming the identity if an infant or child. The collection of DNA on the Infant ***Identi'***fier™ makes this an invaluable tool for forensic scientists.
   - Children who are born from egg or sperm donations, or find homes through adoption, do not share their parents' genetic make up. This situation makes it impossible to extrapolate DNA from the parents to match that to the unidentified or deceased infant for positive identification.
5. It provides the hospital with the recognition that, as an accredited institution, it is committed to providing an extra measure of safety for the infants delivered in their hospital. The Infant ***Identi'***fier™ protects the infant until his/her first dental visit.
6. The Infant ***Identi'***fier™ serves as an accurate, safe, reliable and inexpensive way to provide biometric identification for an infant at birth. It also acts as a method for identifying that child through the first 3 years of life.
7. The dual-ended ***Identi'***fier™, that captures the infant's saliva on one end and the mother's fingerprint on the other, will link the mother to the child, eliminating any doubt of parentage.
8. It can be coupled with a separate Toothprint® bite impression of the mother (taken prior to delivery at the time of admission). the hospital will have put in place the strongest policy and procedure for infant-mother identification.
9. No mess…No storage. The Infant ***Identi'***fier™ requires no ink products as the thumbprint is embedded into the thermoplastic material. It is done under the watchful observation of the mother, and then given immediately to the mother. It requires no storage or systematic filing; further reducing "mix-up" errors.

Conclusion

Non-family infant abductions have been increasing in non-healthcare locations (private homes and public facilities). Now organizations are calling for a more biometric approach to identification and protection of infant identity. This has required the development of an approach beyond what a newborn photograph and an infant footprint can provide. Technological innovation allows for infant biometrics and documenting the maternal/infant linkage. Now no blood samples, no pulling hair follicles, no questionable footprints are required. A three second infant "saliva swipe" and mother fingerprint is all it takes to provide a tool to help identify and track an infant that links the mother-child parentage.

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