

Position Paper One: Impact of Biomedical Engineering on Midwifery

First A. Author (Student ID)

I. INTRODUCTION

This brief personal reflection paper will analyze the history of biomedical engineering as it applies to developments in midwifery. It is the position put forward in this paper that advancements in biomedical engineering have had a profound impact on the field of midwifery, and will continue to have a large impact on the field moving forward. My interest in this subject stems from early childhood, whereby my mother's best friend was a midwife and I became very interested in learning more about it. It will be shown how the impact of biomedical engineering, particularly through the use of ultrasonic imaging, has impacted the field of midwifery a great deal. This paper will therefore endeavour to understand how and why these developments impacted the field of midwifery, as well as how continued developments within biomedical engineering could impact the field of midwifery in the future.

II. THE LITERATURE

The literature relating to this topic is deep and broad. Over the past century, there have been several notable advancements relating to diagnostic imaging, such as the use of ultrasounds, within the field of biomedical engineering and midwifery [1].

Today the field of midwives traces their professional identity back to the period following the midwifery regulation of 1902 in England [1]. Some historians have suggested that this represented a clear break and signalled the willingness of midwives to move towards a status deemed more professional. During the early twenty first century, most midwives remained primarily married or widowed part-time workers [1]. Training for midwives was instituted early in England, though the use of biomedical engineering in the field did not occur until much later.

In the early years of midwifery as a professional discipline, those trained had fairly high caseloads, but their social and economic status was no different from non-trained midwives in the area. Later, according to Cope (1988), regulation had a significant impact on the attitude of doctors towards midwives, who were increasingly viewed as part of a medical structure of care [1]. Also important to note is that midwives also attempted to pursue collective action in order to improve their prospects, but they were in the minority. The limits to their professional development were demonstrated by their lack of control over supervision, their subordinate relationship to doctors, and their inability to work in unison [1].

According to the International Confederation of Midwives (a definition that has also been adopted by the World Health Organization and the International Federation of Gynecology and Obstetrics):

A midwife is a person who, having been regularly admitted to a midwifery educational program that is duly recognized in the country in which it is located, has successfully completed the prescribed course of studies in midwifery and has acquired the requisite qualifications to be registered and/or legally licensed to practice midwifery [2].

In the United States there are two main divisions of modern midwifery: nurse-midwives and direct-entry midwives. Most nurse-midwives work very closely with obstetricians, who provide consultation and assistance to patients who develop complications. In contrast, a direct-entry midwife is educated in the discipline of midwifery in a program or path that does not require prior education as a nurse. These direct-entry midwives learn midwifery through forms of self-study, apprenticeship, or within a private midwifery school, at a college or university-based program, albeit distinct from the discipline of nursing. Direct-entry midwives largely work out of hospital settings, and are trained to provide care to healthy women and newborns throughout the childbearing cycle. Often, women with high-risk pregnancies can receive the benefits of midwifery care from a nurse-midwife in collaboration with a physician, practiced in the field of obstetrics, and this is where techniques concerning biomedical engineering have influenced the field of midwifery.

The history and discipline of biomedical engineering, however, evolved quite differently than that of midwifery. The field of biomedical engineering has provided advancements in medical technology to improve human health, through a multitude of different means. Biomedical engineering achievements range from early devices, such as crutches, platform shoes, wooden teeth, and the ever-changing cache of instruments in a doctor's black bag, to more modern marvels, including pacemakers, the heart-lung machine, dialysis machines, diagnostic equipment, imaging technologies of every kind, and artificial organs, implants and advanced prosthetics. According to estimates from The National Academy of Engineering, there are currently about 32,000 bioengineers working in various areas of health technology [1]. Similar to midwifery in the early years of biomedical engineering there were few regulations or professional

This analysis has endeavored to understand how the field of

midwifery has been influenced by advancements in biomedical engineering, underscoring the need for a community-based model for obstetric care.

REFERENCES

- [1] Z Cope, "History of Midwifery." *British Medical Journal*, 2(5604), 548-548, 1988.
- [2] Spencer, K., Spencer, C. E., Power, M., Dawson, C., & Nicolaides, K. H. "Screening for chromosomal abnormalities in the first trimester using ultrasound and maternal serum biochemistry in a one-stop clinic: a review of three years prospective experience." *BJOG: An International Journal of Obstetrics & Gynaecology*, 110(3), 281-286, 2003.
- [3] B. Lithgow "Biomedical engineering: impressions of developing areas in Australia." *Australasian Physical & Engineering Science in Medicine*, 28(1), 60-65, 2005.
- [4] J. A. Low, Victory, R., & Derrick, E. J. "Predictive value of electronic fetal monitoring for intrapartum fetal asphyxia with metabolic acidosis." *Obstetrics & Gynecology*, 93(2), 285-291, 1999.
- [5] J.P Hessburg, Murthy, P., Patel, K. D., Ostrowski, D. P., & Sienko, K. H. "An Assisted Obstetric Delivery Device for Resource-Limited Settings. International Journal for Service Learning in Engineering," *Humanitarian Engineering and Social Entrepreneurship*, 7(2), 1-12, 2012.
- [6] A. Grant, Ashurst, H., Sleep, J., & McIntosh, J. "Ultrasound and pulsed electromagnetic energy treatment for perineal trauma. A randomized placebo-controlled trial." *BJOG: An International Journal of Obstetrics & Gynaecology*, 96(4), 434-439, 1989.
- [7] A.D. Smeenk, & ten Have, H. A. "Medicalization and obstetric care: an analysis of developments in Dutch midwifery." *Medicine, Health Care and Philosophy*, 6(2), 153-165, 2003.
- [8] R. Bluff, & Holloway, I. "They know best': women's perceptions of midwifery care during labour and childbirth. *Midwifery*, 10(3), 157-164, 1994.