JOURNAL MIDWIFERY (JM)
Jurnal Jurusan Kebidanan, Poltekkes Kemenkes Gorontalo
P-ISSN (2407-8506), E-ISSN (2808-523X)
http://jurnal.poltekkesgorontalo.ac.id/index.php/JM/index
DOI: http://dx.doi.org/10.52365/jm.v11i2.1546

COMPARATIVE STUDY OF PARTUS SET DECONTAMINATION: CHLORINE AND ENZYMATIC ALKAZYME IN INFECTION PREVENTION

Ambar Susanti[1], Listyaning Eko Martanti[2], Dhita Aulia Octaviani[3]
[1,2,3]Department of Midwifery, Poltekkes Kemenkes Semarang
Email: ambar.susanti220177@gmail.com[1], listy@poltekkes-smg.ac.id[2], dhitaaulia@poltekkes-smg.ac.id[3]

ABSTRACT

Introduction: *Childbirth is a daily miracle and a source of joy for families. To reduce maternal and neonatal mortality rates, providing clean and safe delivery care is essential, including infection prevention. One method of infection prevention is decontaminating the partus set. Chlorine-based decontamination is commonly used; however, it has drawbacks, such as causing corrosion at low pH levels. Enzymatic solutions, such as Alkazyme, provide an alternative for decontaminating delivery equipment.*
Objectives: *This study aims to describe the decontamination of the partus set using chlorine and enzymatic Alkazyme as an infection prevention effort at Boja II Community Health Center.*
Methods: *This was a descriptive observational study. The samples consisted of delivery instruments used in childbirth, selected through accidental sampling. The study focused on a single variable: the decontamination of partus sets using chlorine and enzymatic Alkazyme.*
Results: *Decontamination using chlorine at Boja II Health Center showed bacterial presence of 315 CFU/cm² with an average of 52.5 CFU/cm². Meanwhile, decontamination using enzymatic Alkazyme resulted in 127.4 CFU/cm² with an average of 21.2 CFU/cm².*
Conclusions: *Enzymatic Alkazyme leaves fewer bacterial residues than chlorine. Midwives can consider using enzymatic solutions as an alternative method for decontaminating partus sets.*

Keywords: chlorine, enzymatic decontamination, partus set

*Listyaning Eko Martanti, Poltekkes Kemenkes Semarang, Indonesia Jl. Tirto Agung Pedalangan Banyumanik, Semarang, Jawa Tengah, Indonesia, listy@poltekkes-smg.ac.id

INTRODUCTION

Infections remain a major contributor to maternal mortality, responsible for about 10% of deaths during pregnancy, childbirth, and the postpartum period. One significant type is nosocomial infection, which refers to illnesses acquired in hospitals that affect patients during the course of their treatment (Situmorang, 2020).

Several factors contribute to maternal infections, such as untrained birth attendants, non-aseptic procedures, contaminated instruments, and inadequate infection control practices (Gidhar et al., 2024). To protect mothers, newborns, and healthcare workers, midwives as the main providers of maternity care must strictly adhere to infection control protocols during childbirth and the postpartum period (Nafiah et al., 2014; Badawi, 2024).

Infection prevention is an essential component of comprehensive maternal and newborn care, and it must be implemented consistently and thoroughly during midwifery services. All normal deliveries in Kendal Regency are now conducted at Primary Health Centers (Puskesmas) that are equipped to handle childbirth, where midwives serve as the primary healthcare providers during delivery. According to data from the Kendal District Health Office, 30 Puskesmas have been certified to provide delivery services, supported by a total of 634 midwives. Among them, Boja II Health Center employs 21 midwives (Profil Kesehatan Kendal, 2021). Specifically, it should be applied during the provision of basic care in antenatal visits, labor, and the postpartum period. These practices must be integrated into all aspects of care to protect the mother, newborn, family, and birth attendants. (Kementrian Kesehatan RI., 2013) Air, surgical instruments, the patient's skin, internal organs (viscera), and blood are all potential sources of infection. Bacteria and microbes can travel from one location to another using various carriers. These pathogens may be transmitted by humans, animals (such as insects), or contaminated objects (such as medical supplies). Therefore, in such situations, surgical equipment, staff, and doctors all have the potential to transmit pathogens (Sjamsuhidajat, 2017). The steps taken by midwives to prevent infection are directly related to the incidence of infection during childbirth. Findings showed that 56.2% (32 of 110 respondents) had experienced a needlestick injury from used needles (Andhini et al., 2023).

Normal Delivery Care (Asuhan Persalinan Normal/APN) is an approach designed to ensure clean and safe deliveries (Pramesti & Pascawati, 2023). The goal of Normal Delivery Care (Asuhan Persalinan Normal/APN) is to ensure the survival and achieve the highest possible health status for both the mother and her baby

through comprehensive and integrated efforts with minimal intervention, so that the principles of safety and quality of care can be maintained at an optimal level (Rismayanti, 2023).

The Infection Prevention and Control (IPC) Unit is an essential component of the healthcare service system, with a strategic role in enhancing the quality of health services. Its primary goal is to protect patients, healthcare workers, and the wider community from infections related to medical procedures or treatments provided in healthcare facilities (Ardiansyah, 2023).

IPC programs are carried out through various measures, such as implementing isolation and quarantine protocols, preventing nosocomial infections, and providing training for healthcare personnel. In addition, regular audits and evaluations are conducted to ensure that infection control standards are consistently upheld (Putra et al., 2022).

One of the main sources of infection transmission is inadequately cleaned medical equipment. Instruments used in childbirth, such as forceps, scissors, clamps, and others, are highly susceptible to becoming carriers of pathogenic microorganisms. Previous studies have shown that surgical tools can be a source of infection if not properly cleaned and sterilized (Ibrahim, 2019). Hence, it is crucial to conduct decontamination using effective chemical agents to reduce the risk of infection transmission. Decontamination is a process aimed at reducing the number of microorganisms on medical instruments to make them safer for use (Romadhoni & Widowati, 2017) Stated that there are various types of decontamination techniques, including washing and disinfection (Rutala et al., 2023). Decontamination with a chlorine solution is the process of eliminating or reducing the number of harmful microorganisms, including bacteria, viruses, and fungi, from a surface or object using a chlorine-based solution. Chlorine solutions, such as bleach, work by damaging the cell structure of microorganisms, rendering them inactive or killing them (Annisa, 2022). The mechanism of action involves 0.5% chlorine and 70% alcohol destroying microorganisms through oxidation and protein denaturation. (Muzhidah et al., 2017).

Enzymatic cleaners such as Alkazyme are commonly used to break down proteins and reduce the biological load on medical instruments without posing risks to healthcare workers (Infinita Bioteh, 2021). This study compares the effectiveness of chlorine solution and Alkazyme enzymatic solution for decontaminating partus sets at Boja II Community Health Center. Unlike previous research, no study has directly examined these two methods in primary healthcare facilities

(Puskesmas). Addressing this gap, the present study provides novel evidence to guide infection prevention strategies in maternity services and to support efforts to reduce preventable maternal and neonatal mortality.

It aims to reduce the risk of infection and other complications that may arise during childbirth.

Although training on infection control procedures has been carried out, evaluations of the actual implementation of infection prevention measures at childbirth-capable health centers (Puskesmas Mampu Bersalin) in Kendal Regency remain limited (Rangkuti, 2024). This gap highlights the need for research to determine the extent to which infection prevention practices, particularly proper sterilization and decontamination of delivery instruments, are being applied in local healthcare facilities. Therefore, the primary objective of this study is to describe the decontamination of partus sets used in delivery procedures with two different methods—chlorine and enzymatic Alkazyme—and to assess the effectiveness of each method in reducing microbial presence on partus sets after use.

METHOD

This study was conducted at Boja II Community Health Center in Semarang, in collaboration with the Semarang Health Laboratory for microbiological analysis. The variable examined in this study was the decontamination of partus sets using chlorine and enzymatic Alkazyme as infection prevention measures. The microbial count on the partus sets was measured by calculating the number of microbial colonies using a microscope and A Colony Forming Unit (CFU) counter, which indicates the presence of microorganisms capable of causing infection.

Two partus sets used during deliveries at Boja II Health Center between October and December 2023 were included in the study. However, the very small sample size (n=2) constitutes a major limitation and represents a significant weakness of the study. The partus set instruments consisted of a half Kocher clamp, artery clamp, metal catheter, suturing needle, umbilical cord scissors, episiotomy scissors, and needle holder. Each set was decontaminated using one of two methods: one set with chlorine and the other with enzymatic Alkazyme. The decontamination process lasted 10 minutes, followed by rinsing with clean water, drying, and placing in a sterile plastic bag before being sent to the Semarang Health Laboratory for microbial analysis. Samples were selected using accidental sampling; two partus sets were randomly chosen after delivery procedures, with each set decontaminated using one of the designated methods. After decontamination, both sets were taken to the laboratory for

microbial count analysis using microbiological techniques. Primary data were collected directly from laboratory test results, while secondary data included microbial identification results from the lab analysis. The data collection process involved several administrative steps, such as obtaining research permissions from relevant authorities including the ethics committee, Head of the Midwifery Department at Poltekkes Kemenkes Semarang, and the Head of Boja II Community Health Center. The instruments used in this study included a microscope to observe and count microbial colonies on the decontaminated partus sets. Microbial colony identification and enumeration were conducted using the CFU method.

The data were analyzed using univariate analysis to describe the distribution of microbial counts on partus sets decontaminated with both methods. Since the methodology employed was purely descriptive, it restricted the ability to draw causal inferences or establish statistical comparisons between the two decontamination methods. Consequently, the results may not be generalizable to broader populations or different healthcare settings. Further research with analytical or experimental designs and larger sample sizes is recommended to strengthen the evidence and validate these findings. Categorical data were analyzed using proportions or percentages, without the use of more complex statistical analyses, such as means or medians, as the data were predominantly categorical. This study received ethical clearance from the Ethics Committee of Poltekkes Kemenkes Semarang with approval number 1252/EA/KEPK/2023 dated November 27, 2023. All research procedures adhered to ethical research principles, including protection of research subjects and data confidentiality.

RESULTS

This study presents data on the number of microbes found on partus set instruments decontaminated using chlorine and enzymatic Alkazyme. The research was conducted at Boja II Community Health Center in collaboration with the Semarang Health Laboratory. The instruments tested included: half Kocher clamp, artery clamp, metal catheter, suturing needle, umbilical cord scissors, episiotomy scissors, and needle holder.

1. Microbial Count on Partus Set with Chlorine Decontamination

Tabel 1. Microbial Count on Partus Set with Chlorine Decontamination

Instrument	Bacterial Count (CFU/cm²)
Half Kocher Clamp	134
Artery Clamp	128
Metal Catheter	9
Suturing Needle	17
Umbilical Cord	23

Scissors	
Needle Holder	4
Total	315
Average	52.5

Source: Priamary data processed by the author

Table 1 shows that the highest bacterial count using chlorine decontamination was found on the half Kocher clamp (134 CFU/cm²), while the lowest was on the needle holder (4 CFU/cm²). The total bacterial count from all instruments after chlorine decontamination was 315 CFU/cm², with an average of 52.5 CFU/cm².

2. Microbial Count on Partus Set with Enzymatic Alkazyme Decontamination

Table 2. Microbial Count on Partus Set with Enzymatic Alkazyme Decontamination

Partus set	**Bacterial Count (CFU/cm²)**
Half Kocher Clamp	3.8
Artery Clamp	103.0
Metal Catheter	1.9
Suturing Needle	14.0
Umbilical Cord Scissors	1.5
Needle Holder	3.2
Total	127.4
Average	21.2

Source: Priamary data processed by the author

`Table 2 shows that the highest bacterial count after enzymatic Alkazyme decontamination was found on the artery clamp (103.0 CFU/cm²), while the lowest was on the umbilical cord scissors (1.5 CFU/cm²). The total bacterial count from all instruments tested using enzymatic Alkazyme was 127.4 CFU/cm², with an average of 21.2 CFU/cm².

The data presented in Tables 1 and 2 indicate a clear difference in microbial reduction effectiveness between chlorine and enzymatic Alkazyme decontamination methods. While both are commonly used in clinical settings, enzymatic Alkazyme showed superior performance in reducing microbial contamination on most instruments. Chlorine, though widely used due to its affordability and disinfectant properties, yielded a higher total microbial count (315 CFU/cm²) compared to Alkazyme (127.4 CFU/cm²). This limitation may be attributed to chlorine's reduced ability to remove organic debris, such as blood and tissue remnants, which can interfere with subsequent sterilization.

Enzymatic Alkazyme contains enzymes specifically designed to break down proteins and organic matter, facilitating more thorough cleaning. This is evident in the lower average bacterial count (21.2 CFU/cm²) observed after Alkazyme treatment. However, the artery clamp still showed a relatively high microbial count (103.0 CFU/cm²), indicating that instrument complexity and initial contamination levels can impact cleaning efficacy, regardless of the decontamination agent. Additionally, instruments with simpler surfaces, such as the metal catheter and umbilical cord scissors, consistently showed low bacterial counts,

reinforcing the importance of instrument design in cleaning outcomes.

Overall, these findings support the effectiveness of enzymatic cleaners in clinical decontamination processes, especially when used alongside proper handling techniques and sufficient contact time.

CONCLUSIONS

The use of enzymatic Alkazyme solution is more effective than chlorine solution. Instruments decontaminated with chlorine had a total bacterial count of 315 CFU/cm² and an average of 52.5 CFU/cm². Meanwhile, those decontaminated with enzymatic Alkazyme showed a total of 127.4 CFU/cm² with an average of only 21.2 CFU/cm². Although the bacterial count resulting from chlorine decontamination was <100 CFU/cm²—considered acceptable—further washing is recommended to reduce it to <10 CFU/cm². In contrast, the bacterial count after enzymatic Alkazyme decontamination was already <10 CFU/cm², making it adequate for proceeding to sterilization (Zimmerman et al., 2018) These findings indicate that enzymatic Alkazyme leaves fewer bacterial residues compared to chlorine, making it a more efficient alternative for partus set decontamination.

THANK YOU

The researchers would like to express their sincere gratitude to the Director of Poltekkes Kemenkes Semarang and the Director of Semarang City Hospital for the opportunities and support provided, which enabled the completion of this study within the designated time frame.

REFERENCES

Andhini, S. Y., & Istiqamah, I. (2023). Identifikasi Penggunaan Alat Pelindung Diri Pada Pertolongan Persalinan Di Polindes Bati Bati. *Al-Tamimi Kesmas: Jurnal Ilmu Kesehatan Masyarakat (Journal of Public Health Sciences)*, *12*(2), 144-149.

Annisa, S. (2022). Gambaran Penggunaan Disinfektan Pada Rumah Tangga Selama Pandemi Covid-19 Di Wilayah Jabodetabek Tahun 202.

Ardiansyah, R. T. (2023). Pencegahan dan Pengendalian Infeksi Di Fasilitas Kesehatan Tingkat Pertama (FKTP).

Badawi, B. (2024). Asuhan Kebidanan Persalinan Normal.

Girdhar, J., Shandilya, K., Husaain, M., Kaur, P., Mahajan, S., Singh, T., ... & Dhanawat, M. (2025). A Review of the Difficulties Faced by Low and Middle-income Countries in Hygiene and Healthcare Practices. Infectious Disorders-Drug Targets, 25(3), E18715265307717.

Ibrahim, H. (2019). Pengendalian Infeksi Nosokomial dengan Kewaspadaan Umum Di Rumah Sakit (Integrasi Nilai Islam dalam Membangun Derajat Kesehatan).

Infinita Biotech. (2021). Role of Enzymatic Cleaners in the Disinfection Process. Disinfectants.

Kementrian Kesehatan RI. (2013). Pelayanan Kesehatan Ibu Di Fasilitas Kesehatan Dasar dan Rujukan.

Muzhidah, M., Sukartini, T., & Sunarno, A. (2017). The Effect of Combination Between Chlorine 0.5% and Alcohol 70% to

Bacteria's Growth. Jurnal Ners, 4(1), 19–23. https://doi.org/10.20473/jn.v4i1.5006

Nafiah, U., Purnami, C. T., & Wulan, L. R. K. (2014). Beberapa Faktor yang Mempengaruhi Pelaksanaan Prosedur Pencegahan Infeksi pada Pertolongan Persalinan Normal di Kabupaten Pati (Studi pada Bidan Desa Pasca Pelatihan APN).

Pramesti, A., & Pascawati, R. (2023). Asuhan Kebidanan Komprehensif dengan Penerapan Birth Ball Pada Persalinan Di Wilayah Kerja Puskesmas Cilawu Kabupaten Garut Tahun 2023.

Profil Kesehatan Kendal 2021. (n.d.).

Putra, A. N. P., Wahyuni, I. D., & Rupiwardani, I. (2022). Program Pencegahan dan Pengendalian Infeksi (PPI) Di Rumah Sakit X Kabupaten Malang. 2.

Rangkuti, N. H. (2024). Sanitasi Ruang Perawatan di Rumah Sakit- Menjaga Kebersihan untuk Mencegah Infeksi Nosokomial.

Rismayanti, N. R. (2023). Hubungan Pelatihan APN (Asuhan Persalinan Normal) Terhadap Perilaku Bidan dalam Menolong Persalinan Di Wilayah Kerja Puskesmas Limbangan Kabupaten Garut Provinsi Jawa Barat Tahun 2022. Jurnal Kebidanan Besurek, 8(1), 21–26. https://doi.org/10.51851/jkb.v8i1.408

Romadhoni, S., & Widowati, E. (2017). Penerapan Kewaspadaan Standar Sebagai Upaya Pencegahan Bahaya Biologi Pada Tenaga Keperawatan.

Rutala, W. A., Boyce, J. M., & Weber, D. J. (2023). Disinfection, sterilization and antisepsis: An overview. American Journal of Infection Control, 51(11), A3–A12. https://doi.org/10.1016/j.ajic.2023.01.001

Situmorang, P. R. (2020). Hubungan Pengetahuan Bidan Tentang Infeksi Nosokomial dengan Tindakan Pencegahannya Pada Pasien Bedah Seksio Sesarea. Jurnal Keperawatan Priority, 3(1), 83. https://doi.org/10.34012/jukep.v3i1.811

Sjamsuhidajat. (2017). Buku Ajar Ilmu Bedah. EGC.

Yohana, T., Korah, B. H., & Dompas, R. (2015). Hubungan Penget Tentang Penceg. 3.

Zimmerman, P.-A., Jacques, M., & Rowland, D. (2018). Instilling a culture of cleaning: Effectiveness of decontamination practices on non-disposable sphygmomanometer cuffs. Journal of Infection Prevention, 19(6), 294–299. https://doi.org/10.1177/1757177418780997