

Article

# Development of a Midwifery Education Program to Foster Motherhood in Women with Twin Pregnancies after Assisted Reproductive Technology

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## Abstract

In this study, we developed educational programs for midwives to cultivate maternal identity in women who became pregnant with twins via assisted reproductive technology (ART). The study applied a meta-synthesis (meta-integration) design. First, PubMed, CINAHL, and Ichushi-Web were searched for candidate studies using the keywords “assisted reproductive technology,” “twins,” “women” or “mothers,” and “midwifery.” Subsequently, maternity care themes were identified using Noblit and Hare’s meta-synthesis methodology. Educational programs for midwives were then developed based on the themes extracted. The four main themes relevant to midwifery care for mothers in ART-induced twin pregnancies were: 1) respectful care specific to women with twin pregnancies after ART, 2) helping women understand and accept the high risk associated with twin pregnancies, 3) fostering self-identification as a mother, and 4) providing continued support informed by the characteristics of women who undergo ART, from the fertility treatment to parenting stages. Five specific frameworks for midwifery education programs for women with twin pregnancies after ART were formulated: 1) providing specialized care informed by the characteristics of women who conceived twins via ART, 2) helping women understand and come to terms with their experience, 3) supporting self-identification as mothers during pregnancy, 4) fostering a strong sense of motherhood directly after birth, and 5) collaboration and cooperation among medical professionals involved in the fertility treatment to parenting stages. This study offers several programs to educate midwives on support practices to help them find meaning in their ART experiences and promote their self-identification as mothers.

## Keywords:

Assisted reproductive technology, Twin pregnancy, Midwifery education program

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The remarkable progress in assisted reproductive technology (ART) in Japan has led to an increasing number of related procedures applied each year. Some women who avail themselves of ART-related procedures have conceived twins as a result. Since many are first-time mothers and in their late reproductive ages (over 35), their need for support is especially high (Ooki & Hiko, 2016). Pregnant women begin to construct their identity as mothers once they start experiencing fetal stirrings and physical changes in their bodies, which helps them envision the growing fetus, thereby enhancing maternal attachment (Klaus & Kennel, 1982; Rubin, 1984, 1997). However, in the case of twins, the mothers' process of envisioning the children-to-be during pregnancy is typically stifled by their previous failed attempts of becoming a mother via ART; consequently, they worry about healthy delivery of the babies (Fujii, 2014). Midwives must understand the experiences of these women from the early stages of fertility treatment and assist them to prepare for motherhood accordingly.

Experiences peculiar to women who conceived twins after ART have been previously studied. Health providers categorize twin pregnancies as high-risk and encourage the concerned mothers to be more conscious of their health. This advice tends to increase the anticipatory anxiety of women with ART-induced pregnancy. Even after the uneventful healthy birth of their twins, some cannot dispel fears of their children's sudden death (Fujii, 2021).

Japan is facing an increase in cases of child abuse counseling. Experts attribute this problem to changes in living arrangements owing to the stay-at-home measures implemented in response to coronavirus disease 2019. Specialized services for multiple-birth households were introduced in 2020, including a new prenatal and postnatal support program aimed at preventing abuse, marking the first-ever budget appropriations for such services in the country, and raising public awareness regarding the need for such support. These services offer women little more than burden reduction. The need for assistance is specifically high in households that raise children from multiple-birth pregnancies, where the risk of death due to abuse is roughly 2.5–4 times higher than in single-birth pregnancy households (Japan Multiple

Birth Association, 2018). These women should be supported from the early stages of pregnancy based on the knowledge of the characteristics of multiple-birth households, such that they can grow into motherhood untroubled and attached to their two children to reduce psychological and physical burdens.

This study aims to develop educational programs for midwives to help women who become pregnant with twins via ART cultivate maternal identity.

## Methods

Findings of previous studies on women who conceived twins following ART were cross-referenced to develop our education programs; we believed that program themes could be explicated by inferring the characteristics of this group. The study methodology was based on the meta-synthesis model of Noblit and Hare (1988). Eligible studies were selected, and their relevance to this review was confirmed and then interpreted across studies. The results were integrated and analyzed to identify common themes in midwifery care for women who had twin pregnancies using ART and were incorporated into program designs.

### *Literature selection*

The screening criteria for this study were research articles in which midwives described women's experiences with ART twin pregnancies and the process of becoming mothers. The inclusion criteria were: 1) literature that mentions midwifery care for women with twin pregnancies after ART or the care that women with twin pregnancies after ART want from midwives and nurses and 2) studies in English or Japanese. The exclusion criteria were: 1) literature on abnormal deliveries and 2) literature on non-human subjects. A comprehensive search was conducted across the PubMed, CINAHL, and Ichushi-Web databases for relevant studies published between January 2000 and May 2021. The keywords used for this search included “assisted reproductive technology,” “twins,” “women” or “mother,” and “midwife.”

This search resulted in the extraction of 19 studies from PubMed, three from CINAHL, and three from Ichushi-Web. After removing duplicate

Table 1. Overview of eligible papers

	1	2	3	4
Author	Fujii (2014)	Fujii (2016)	Fujii (2021)	Fujii and Aizawa (2020)
Objective (s)	To clarify the process of motherhood in women with twin pregnancies by ART, from the period of fertility treatment to around six months after delivery.	To describe the experience of motherhood for women who gave birth to twins after ART, from six months to two to three years of age.	To identify the experiences and expected midwifery care of women who have twin pregnancies later in life after ART.	To determine midwives' perceptions of midwifery care for women with twin pregnancies following ART.
Methods	The life story method	The life story method	Riessuman's thematic analysis	Riessuman's thematic analysis
Summary of Results	They also tried to make positive sense of their unresolved past, such as the experience of damage to their self-esteem during fertility treatment, to accept the past and move on with their lives as mothers.	Through the experience of becoming a mother and her relationships with the people around her and her twins, a woman who had given birth after ART could make positive sense of the process of becoming a mother of twins.	There are four distinctive experiences: (a) persistent anxiety during and after pregnancy, related to the possible sudden loss of one or both children, (b) panic associated with parenting twins, etc. Four themes of care were found: (a) to be provided with information to dispel their anxieties related to having a high-risk pregnancy, (b) to be appreciated for the effort involved in carrying and then raising twins, etc.	Midwives are aware of (a) pregnancy dominated by anxiety, (b) the burden of an advanced maternal age pregnancy in addition to the pressures of a twin pregnancy, (c) bewilderment over the gap between one's ideal and reality due to picturing delivery as the goal, (d) mothers who felt distant from their children, (e) need for ongoing support, (f) lack of consideration that the mother underwent ART.

references, a total of 24 articles were retained. Two researchers independently conducted a title review and an abstract review to refine this list further, ultimately narrowing it down to three articles. In addition, one more article was identified through a manual search, aimed at capturing relevant studies not included in the database searches.

As a result, all four of the selected articles were in Japanese (Table 1). It was decided to focus exclusively on these Japanese-language publications for analysis. This decision was based on the premise that limiting the study to Japanese literature would provide clearer insights into midwifery care within the unique context of Japanese culture and the medical environment.

*Reanalysis of care practices that cultivate maternal identity in ART-induced twin pregnancies*

The analytical method was employed with reference to the meta-synthesis model (Noblit & Hare, 1988, pp. 26–29). Noblit and Hare (1988)'s

approach encompasses seven stages. In the first stage, qualitative research is examined to identify the researcher's intellectual interests and select papers worthy of integration. The second stage involves identifying papers related to these interests. The third stage requires repeated reading of the target papers, focusing on their interpretive metaphors. In the fourth stage, the task involves determining how the studies are interconnected. The fifth stage involves translating the metaphors and concepts of individual research findings while comparing them. The sixth stage refers to the integration of these translations, where the work translated in the fifth stage is compared, interpreted, and analyzed for integration. The seventh and final stage represents the expression of this integration. In this study, we selected four papers after completing the first and second stages. These four chosen papers focused on common themes in midwifery care for women pregnant with twins through ART. They examined how the process

of becoming a mother of twins is influenced by ART experiences, and we individually reanalyzed them. As the author of this study contributed to all four papers, primary research data were utilized to verify new interpretations in stages three to five. Relevant themes were named and categorized according to similarities or dissimilarities in care practices, cross-referencing results from Studies 1 and 3. While mothers were the subjects in these three studies, Study 4 focused on midwives, aiming to elucidate their perception of women post-ART. Care practices nurturing maternal identity were identified using a qualitative recursive approach. This involved combining corresponding themes identified in Studies 1 to 3 with the themes of midwifery care revealed in Study 4 (emphasizing the causes of perception gaps among midwives), classifying them in the sixth stage, and integrating them as a whole in the seventh stage to document the results.

#### *Validity considerations*

During the formulation of the education programs, the content validity and clinical reproducibility of the care practices proposed were examined by three experienced midwives (mid-level or higher) working at perinatal medical centers.

## **Results**

### *Themes in midwifery care in ART-induced twin pregnancy*

Table 2 presents a list of midwifery care themes relevant to mothers in ART-induced twin pregnancies. The four main themes are as follows: 1) respectful care specific to women with twin pregnancies after ART; 2) helping women understand and accept the high risk associated with ART pregnancies; 3) fostering self-identification as a mother; and 4) providing continued support informed by the characteristics of women who undergo ART, from the fertility treatment to parenting stages.

### *Respectful care specific to women with twin pregnancies after ART*

This theme refers to customizing the care provided to a woman during ART-induced twin pregnancy by consulting her history of fertility

Table 2 Challenges for midwifery care posed by qualitative integrated research

Category	Subcategory
Respectful care specific to women with twin pregnancies after ART	<ul style="list-style-type: none"> <li>• lack of knowledge about specialized care practices after ART</li> <li>• hesitation in providing care that differs from cases of natural pregnancy</li> <li>• non-application of fertility treatment history</li> </ul>
Helping women understand and accept the high risk associated with twin pregnancies	<ul style="list-style-type: none"> <li>• monitoring women's distant relationship with their children during pregnancy</li> <li>• helping women accept their twin pregnancy under unwanted circumstances</li> <li>• accounting for women's concerns about high-risk pregnancy, which overlap with anticipatory worries of vulnerable or abnormal pregnancy consequent to ART utilization</li> <li>• providing responses that do not provoke worry</li> <li>• sharing information about risks due to twin pregnancy.</li> </ul>
Fostering self-identification as a mother	<ul style="list-style-type: none"> <li>• promoting a sense of reassurance by relieving tension</li> <li>• drawing attention to children's 'vitality by promoting connection with the babies</li> <li>• recognizing lingering psychological discomfort from ART experiences by accepting unresolved experiences</li> <li>• supporting the acquisition of maternal roles by promoting mothers to accept motherhood</li> </ul>
Providing continued support informed by characteristics of women who undergo ART, from the fertility treatment to parenting stages	<ul style="list-style-type: none"> <li>• interruption of continuous midwife support</li> <li>• coordination/cooperation with fertility clinics and childbirth facilities</li> <li>• coordination/cooperation from the prenatal admission ward to the postnatal ward</li> <li>• coordination/cooperation from the postnatal ward to the community health center</li> <li>• helping women visualize life after childbirth</li> <li>• getting women connected with other mothers of twins</li> </ul>

treatments. It consists of three subthemes: lack of knowledge about specialized care practices after ART, hesitation in providing care that differs from cases of natural pregnancy, and non-application of fertility treatment history. Expectant mothers of twins who conceive via ART are burdened with many issues after delivery, and unlike women who conceive naturally, they exhibit some psychological distance from their children. Realizing these tendencies, midwives strongly believe that perinatal care needs to be specialized in cases of ART-induced pregnancies. Post-ART mothers were also more likely to leave their newborn babies with midwives at night than women who conceived naturally in hospitals. Since midwives do not have a clear rationale for customizing care practices in ART pregnancies, they are unsure of how to provide care differently from natural pregnancies and therefore fail to utilize expectant mothers' history of fertility treatments. Some midwives are hesitant to provide care differently from the way it is given in natural pregnancies because they believe that it would lead to negative or prejudiced feelings among women with ART-induced pregnancy. As a result, midwives focus on high-risk twin pregnancies without applying ART-related information.

*Helping women understand and accept the high risk associated with twin pregnancies*

This theme refers to the efforts by midwives to understand and relate to women's traumatic experiences during ART therapy and how they manage a high-risk, unwanted twin pregnancy. In particular, it refers to monitoring expectant mothers to understand their feelings toward their anticipatory motherhood while accounting for the effects of ART pregnancy on children, as well as the worries associated with any high-risk pregnancy. It consists of five subthemes: monitoring women's distant relationship with their children during pregnancy; helping women accept their twin pregnancy under undesirable circumstances; accounting for women's concerns about high-risk pregnancy, which overlap with anticipatory worries of vulnerable or abnormal pregnancy consequent to ART utilization; providing responses that do not provoke worry; and sharing information about risks of twin pregnancy. Such women have had their hopes of becoming

mothers dashed during fertility treatments many times before. When they experience a high-risk twin pregnancy via ART, midwives can help them perceive it positively (temporarily) by using reassuring language and interactions to dispel their worries. However, it is challenging to alleviate their concerns for long, as mothers-to-be typically try to create (psychological) distance between themselves and their children until they are born healthy, to prepare themselves to accept even the worst-case scenario. Midwives should attentively listen to such women's ART experiences and use them to help reframe their longstanding worries and find meaning in a high-risk twin pregnancy. Since the risk level of twin pregnancy depends on embryo count and week of gestation, such conversations should not merely emphasize the high risk of twin pregnancies. For instance, a midwife may tell a pregnant woman with a dichorionic twin pregnancy that "twin pregnancies are high risk because abnormalities such as twin-twin transfusion syndrome may develop," regardless of their individual risk. In general, pregnant women should not be made to feel unnecessarily anxious. Instead, midwives should recognize that all mothers and children are different and further focus on sharing information about objective risks for applicable conditions on a case-by-case basis.

*Fostering self-identification as a mother*

This theme involves care practices that strengthen women's feelings of becoming mothers once they deliver their children. It consists of four subthemes: promoting a sense of reassurance by relieving tension; drawing attention to children's vitality by promoting connection with the babies; recognizing lingering psychological discomfort from ART experiences by accepting unresolved experiences; and supporting the acquisition of maternal roles by prompting mothers to accept motherhood.

Women who conceive via ART are constantly mindful of the worst possible outcomes of pregnancy, such as stillbirth or fetal abnormalities. Many women who undergo ART have experienced miscarriages or stillbirths during such treatment. Therefore, as a coping mechanism for accepting the shock of reliving a previous miscarriage or stillbirth during the pregnancy of twins, these women continue to dwell on the possibility

that they will still not be able to become mothers during their current pregnancy. A hospital transfer to a perinatal medical center is an opportunity for the mother to become acutely aware of the high risk of a twin pregnancy. She suppresses the typical joy of becoming a mother by telling herself that it is unlikely that she will be able to carry two children in her body, as she has never been able to carry even a singleton to term. Stressful emotions are further inflamed after childbirth by various factors such as excess post-labor pain (i.e., giving birth to two infants instead of one), surgical wound pain, and feelings of isolation if the babies are delivered preterm.

Midwives should help relieve their distress immediately after a twin delivery and try to reduce the mothers' emotional distance during gestation to perceive their children as strong and sturdy. For example, support from midwives can promote connections, such as early skin-to-skin contact, direct breastfeeding, and newborn twins' inherent characteristics of communication with their mothers. Support should also target the acquisition of maternal roles, using birth reviews or other measures to elicit unresolved experiences from mothers' ART treatment days and encourage them to come to terms with those experiences to help them realize that they have now become a mother.

*Providing continued support informed by characteristics of women who undergo ART, from the fertility treatment to parenting stages*

This theme involves providing women with continued support from childbirth to the parenting stage, guided by information about their history of fertility treatments shared among medical professionals. It consists of six subthemes: interruption of continuous midwife support, coordination/cooperation with fertility clinics and childbirth facilities, coordination/cooperation from the prenatal admission ward to the postnatal ward, coordination/cooperation from the postnatal ward to community health center, helping women visualize life after childbirth, and getting women connected with other mothers of twins.

Every mother has different ART experiences and risks from a twin pregnancy, which she must overcome before parenting her twins. The process by which a woman pregnant with twins considers herself a mother is guided by her interactions

with a variety of healthcare professionals. For example, at the clinic where she underwent fertility treatments, at the hospital that accepts her twin pregnancy, at the prenatal ward where she is admitted for a high-risk pregnancy, at the postnatal ward, and even at the neonatal ICU in the event of preterm birth. Medical professionals involved in caring for such women must cooperate from the fertility treatment to the parenting stages, sharing necessary information about their ART history.

*Midwifery education programs for cultivating maternal identity in ART-induced twin pregnancies*

The content validity and reproducibility of the midwifery care themes and programs, identified and designed by the author, were confirmed by three experienced midwives working in twin pregnancy care at perinatal medical centers. The learning objectives of specific programs were explored after obtaining positive opinions from all three participants.

Learning objectives

Note: Numbers within <angle brackets> denote the corresponding program(s).

- (1) To provide specialized midwifery care to mothers of twin pregnancies by understanding their experiences from infertility treatment. < 1 >
- (2) To help women find meaning and come to terms with their ART experiences by listening to their accounts of frustrating fertility treatments and unpleasant lingering emotions. < 2 >
- (3) To help women deepen their relationship with their children during pregnancy. < 3, 4 >
- (4) To learn and share information about the characteristics of high-risk pregnancies and concerns that overlap with the anticipatory worry associated with ART-induced pregnancies. < 3 >
- (5) To provide care that relieves women's feelings of tension and stress after birth. < 4 >
- (6) To encourage skin-to-skin contact from an early stage after birth to help mothers recognize their children's vitality. < 4 >
- (7) To support continued breastfeeding while respecting mothers' wishes. < 4 >
- (8) To connect expectant mothers with other twin households while pregnant. < 3 >

- (9) To learn the characteristics of expectant mothers when providers collaborate from the fertility treatment to parenting stages. < 5 >

*Basic program structure*

- (1) Lecture (45 minutes): Participants attend a lecture, the content of which depends on the specific goal(s) of the program in question. During the lecture, they are provided time to reflect on their care practices and identify personal challenges.
- (2) Exercise (45 minutes): Participants discuss specific care practices and standards and examine which ones are feasible to implement. Program-specific frameworks for exploring aspects of midwifery care are shown under headings (1) to (5) below.

*Program content*

- (1) Providing specialized care informed by the characteristics of women who conceived twins via ART

To date, research findings on the experiences of women who conceive twins via ART are presented through lectures. In the subsequent exercise, participants discuss care practices that accommodate different aspects of “ART” and “twin pregnancy,” allowing them to reflect on current practices and consider what would be achievable.

- (2) Helping women understand and come to terms with their experience

Participants learn via lectures about the feelings of women who undergo ART and the need to encourage them to express unpleasant emotions (e.g., dissatisfaction, worries, doubts) in response to providers’ language and behavior. Participants are also taught about the need for support in encouraging women to come to objective terms with unresolved, lingering trauma from their ART experiences.

- (3) Supporting self-identification as mothers during pregnancy

In the lecture, participants are instructed to support mothers in a twin pregnancy by helping them accept the fact that they are carrying two children, and to encourage them to bond with twins early. This is done by repeatedly explaining that children conceived by ART are born healthy and that ART pregnancies follow an ordinary course and by watching

their language and behavior as midwives to avoid causing their patients any unnecessary consternation. Participants are also instructed in specific practices in midwifery care to alleviate the concerns of mothers, for example, connecting mothers-to-be with other twin households before childbirth, providing explanations of government services for postnatal care, and sharing personalized information about the risks of twin pregnancy based on their circumstances.

- (4) Fostering a strong sense of motherhood directly after birth

Participants learn about the necessity of practices such as early skin-to-skin contact, kangaroo care, and direct breastfeeding to ensure that the newborn babies are healthy and make the mothers feel that their children are safe and full of vitality. The need to proactively ask about women’s childbirth experiences and conduct a birth review is also explained, along with footbaths, massages, and other tension-relieving care practices, as well as checking that they are not in pain and are getting sufficient sleep. Finally, they are told about care practices that help women understand their children’s traits and needs (especially for breastfeeding support) and instill feelings of connection with their children.

- (5) Collaboration and cooperation among medical professionals involved in the fertility treatment to parenting stages

Through the lecture, participants learn about the need to share information about aspects of ART and how twin pregnancy is received by these women. During the exercise component, participants are given time to discuss amongst themselves the realities of cooperation or collaboration with other providers, such as outpatient nursing staff from fertility clinics, ward staff during a planned admission, nursing staff in the NICU and postnatal ward, and public health or welfare programs after discharge, offered by community health centers.

**Discussion**

The educational programs described above

underline the need for midwives to understand the characteristics of—and provide continuous support to—women who had undergone ART and twin pregnancies. The discussion will focus on two topics: the characteristics of women who conceived twins via ART, and the provision of continuous support starting from the fertility treatment stage.

Stern et al. (1998) suggested that a pregnant woman's new identity as a mother is formed because of three things simultaneously “building” inside her: the fetus growing in her womb, the sense of motherhood taking root in her heart, and the children she envisions in her head (Stern et al., 1998). Approximately 94% of women who naturally had single-birth pregnancies reported imagining their child inside the placenta as well as the child's sex during early pregnancy (Misawa et al. 2004). It seems reasonable to claim that these women forge their new identity as mothers by imparting a specific form to their children using their imagination (Stern et al., 2012). Women who conceive twins via ART, in contrast, deliberately put themselves in a stressful mindset during pregnancy and refrain from envisioning the children growing in their womb, which amounts to denying their motherhood (Fujii, 2014).

Post-ART, women tend to view their children as frail and vulnerable (Gibson et al. 2000); women who conceive twins after infertility treatment have been shown to have strong concerns about preterm birth and miscarriages (Hattori & Maehara, 1997). When induced by ART, women have concerns about their children's health, even with a single pregnancy. In a twin pregnancy, such concerns are compounded by the high risks associated with twin pregnancies. Denying one's upcoming motherhood is a coping strategy adopted by many women following ART-induced twin pregnancy, as it is a way for them to avoid the shocks of revisiting past disappointments and dashed hopes of motherhood.

Perceiving pregnancy and childbirth as “goals” is a crucial characteristic of women who conceive via fertility treatments (Okajima & Kabeyama, 2005). Specifically, in multiple pregnancies, women need to prepare themselves to raise twins, from the early stage of pregnancy, by imagining the life after childbirth, since the parenting stage will start before her body has fully recovered from

childbirth.

Japanese midwife education has responded to social trends caused by advances in ART (e.g., increasing maternal age and a higher number of high-risk pregnancies) by concentrating on strengthening clinical reasoning skills related to identifying deviations from ordinary and predicting abnormalities, and practical skills for responding quickly and adaptively in unusual situations. However, hardly any training has focused on the psychology of women who conceive twins via ART, either in midwifery education. Textbooks used in midwife education treat multiple pregnancies as a high-risk category for both mothers and children and outline the associated problems of preterm delivery, maternal complications, and fetal growth abnormality (Shinya, 2021). For this reason, clinical midwifery care for a twin pregnancy primarily consists of measures to prevent preterm delivery and pregnancy complications. As their training gives pre-eminence to preventing abnormality in twin pregnancies, providers tend to explain more about its high-risk nature. Such explanations risk intensifying women's worries, causing them to deny feelings of motherhood. This reveals the importance of how and what information should be shared with mothers when discussing midwifery care.

Worry is a common characteristic among women who become pregnant with twins due to ART. Some of them report persistent worries of vulnerability from the time of ART treatments, a complex overlap with concerns about the high risk of twin pregnancy, and worries about an uncertain future (Fujii, 2014). Based on an understanding of the characteristics of such women, midwives must help them go through pregnancy relatively peacefully by giving them details of the potential risks they may face as individuals, while neither emphasizing the general “high-risk” classification nor aggravating worries of any such complications.

Rubin (1984) has mentioned that women may decide not to bond with their newborn child if they (or the child) feel stressed or are in pain. However, he states, “The comforting peace and tranquility that heals many hurts, and the full, nonverbal communion in the warm contact with her infant is one of the most gratifying experiences of having a baby.” Following ART-induced twin pregnancy,



new mothers must start raising their two children amidst feelings of isolation, severe postpartum pain, and anemia. Since many such pregnancies do not reach full term, affected mothers continue to feel stressed even after childbirth; for example, they worry about the effects of being born prematurely on their children's growth. Such conditions hardly seem tranquil. It is critical that new mothers feel that their children are out of danger once born and are supported by an environment and interactions in which they feel relaxed, comfortable, and optimistic.

Based on the discussion above, ART-induced twin pregnancy seems to be defined by a combination of two key characteristics: difficulty imagining life post-delivery and being regarded as synonymous with a high-risk pregnancy. Educational programs that train midwives to understand the characteristics of such women and support them to become mothers comfortably are essential.

Women who use ART often have similar stories. They live with a purpose—that is, to become pregnant—for which they follow the instructions of their doctor as they undergo fertility treatments and remind themselves of the reason for taking related medications. Such women could experience more substantial worries about raising a child with “no one right answer” for their challenges, depending on postpartum conditions. Midwives must safeguard the process of becoming a mother by listening attentively to their ART experiences (when, how long, and so on), whether the treatments were performed to their satisfaction, what their spouses and social circles thought, and of course, their thoughts and experiences during their fertility treatments and the pregnancy itself.

Finally, to encourage women to accept their experiences from ART to post-delivery, midwives must start sharing information about these women among themselves, dating back to their fertility treatments. The programs developed in the present study were refined by soliciting the opinions of mid- or higher-level midwives. The results suggest that sharing ART-related information is feasible if healthcare providers appreciate its necessity. The effectiveness and applicability of the programs in clinical settings need to be verified.

The primary limitation of this study was the bias in the research methods of the target articles.

The number of articles on the two concepts of ART and twin pregnancies was small, and the target articles were all inductive studies. Future studies should consider these limitations and incorporate deductive approaches to broaden the scope.

## Conclusion

This study aimed to develop midwife education programs to care for women who conceive twins via ART. Specific characteristics of this group were identified by cross-referencing the results of four research articles that describe care practices in ART-induced twin pregnancies. Relevant issues were identified and reanalyzed to determine the necessary components of care. The results were synthesized to identify themes in midwifery care for this population and develop corresponding midwifery education programs. Five specific program frameworks were formulated: (1) providing specialized care informed by the characteristics of women who conceived twins via ART, (2) helping women to find meaning in their ART experience, (3) supporting self-identification as mothers during pregnancy, (4) fostering a strong sense of motherhood directly after birth, and (5) collaboration and co-operation among medical professionals from fertility treatment to parenting stages. Implementing these midwifery care training programs and verifying their effectiveness are topics for future studies.

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## Conflicts of Interest

None.

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