Characteristics of Socially High-risk Pregnant Women in Telephone Triage

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Abstract

Background

To clarify the frequency, co-occurrence of relationships, and characteristic words of socially high-risk pregnant women who contacted the night telephone triage for advice on pregnancy.

Methods

We performed a quantitative study involving 5,548 of 13,496 pregnancy cases recorded by telephone triage. The contents of telephone triage conversations were examined to determine whether they fulfilled the requirements for each category of socially high-risk pregnant women. The frequency, co-occurrence of relationships, and characteristic words of each category ofsocially high-risk pregnant women were analyzed.

Results

There were 432 socially high-risk pregnant women. Among 15 categories of socially high-risk pregnant women, young pregnant women (183 cases), mental illness (88 cases), and no antenatal care (80 cases) were the top three categories. There was a strong co-occurring relationship between the following categories of socially high-risk pregnant women: out of touch and lack of supporters; no antenatal care and money matters; out of touch and unmarried; no antenatal care and no issue; money matters and lack of supporters; no issue and lack of supporters; and money matters and unmarried.

In characteristic words, some words did not overlap with the top 10 words in other categories.

Conclusions

A telephone triage that allows pregnant women to freely talk about their concerns with a coordinator might be useful for detecting socially high-risk pregnant women. To efficiently identify socially high-risk pregnant women, it might be necessary to understand the characteristic words of each category and subsequently determine if the client fulfills the criteria for more than one category of socially high-risk pregnant women.

Background

Child abuse has been frequently reported in Japan. Therefore, identifying socially high-risk pregnant women (SHRPW) early and supporting them is crucial. SHRPW are defined as pregnant women who need support during pregnancy and help in raising their child after childbirth. To prevent child abuse, it is necessary for municipalities, such as cities, wards, towns, and villages, to understand SHRPW and prepare a system of support after childbirth. The night telephone triage for pregnancy support (telephone triage) was established in a public center in Hokkaido, Japan, in 2008. Studies on SHRPW who had already been found and supported by local governments and medical institutions have been previously performed.[1–5] However, no study has examined the characteristics of SHRPW who utilized telephone triage. This study aimed to clarify the frequency, co-occurrence of relationships, and characteristic words of each SHRPW category based on the conversations of women who utilized telephone triage.

Methods

A quantitative study investigating data of 13,496 telephone triage cases from October 1, 2008 to September 30, 2016 was performed. The public health center in Hokkaido, Japan, employed medical personnel, including midwives and a public health nurse, as coordinators of the telephone triage. Midwives provided necessary triage, advice, and guidance during consultations with patients at night. When midwives received emergent requests from ambulance attendants and obstetricians to transfer patients at night, they recommended the appropriate hospitals which they checked thoroughly during the daytime. The public health center of Hokkaido, Japan cooperated with our study at our request. Data excluding the clients' names, telephone numbers, and addresses were analyzed with permission from the center.

Of the 13,496 telephone triage cases, 5,548 pregnancy cases were used for this study. The contents of these 5,548 telephone triage conversations were examined to determine whether they fulfilled the requirements for each SHRPW category. "Social high-risk pregnant women who really need support from the beginning of pregnancy"[6] and "A guide to responding to child abuse"[7] by the Japanese Ministry of Health, Labor and Welfare were used as criteria for judging SHRPW.

The 15 SHRPW categories were as follows: young pregnant women (pregnant teens); money matters; an emotional conflict; no issue (pregnant women who had not yet received a maternal and child health handbook issued by municipalities since the second trimester of their pregnancy); no antenatal care (no ANC; pregnant women who had one or fewer obstetrical consultations since the second trimester of pregnancy); multiple pregnancies; mental illness; foreign nationality; unmarried; intimate partner violence (IPV); out of touch (out of touch with the baby's father); lack of supporters (lack of supporters except for the baby's father); police report; attempted suicide; and divorce (pregnant women who were divorced). Pregnant women who did not wish to continue the pregnancy and were planning an artificial abortion were excluded from the survey. Non-SHRPW were defined as pregnant women who did not belong to any of the SHRPW categories. There were 5,116 non-SHRPW; of these, 1,842 reported genital bleeding, 1,325 reported abdominal pain or discomfort, and 1,131 reported fever or vomiting. We analyzed the data using a text mining method and KH Coder,[8] which is a software program used for quantitative content analysis that supports Japanese text. This program consists of R programming language and the "ChaSen" language morphology analysis system as the backend program. KH Coder creates a list of words ordered according to their frequencies and inter-relationships. The detailed patient description was resolved into word units, and empty words and proper nouns that were not suitable for the analysis were excluded. To analyze the co-occurrence of relationships between different categories and the characteristic words of each category, the Jaccard coefficient[9] was determined using Eq. 1.

Equation 1: $J(A,B) = |A \cap B| / |A \cup B|$

The Jaccard coefficient of a co-occurring relationship represents the simultaneous appearance rate of two categories, and that of the characteristic words represents the appearance rate of a word in a certain category.

This study was approved by the Ethics Review Committee of Hokkaido University Graduate School of Health Sciences (approval number: 16–81). As the data were administrative information that can be disclosed to anyone, we confirmed the view of Hokkaido's public health center (a telephone triage center) that informed consent from participants were not required for the use of data except for the name, address, and telephone number.

Results

Initially, 469 cases were considered to be SHRPW; however, discussions among multiple researchers concluded that only 432 of these cases were SHRPW, accounting for 3.2% of all telephone triage cases and 7.8% of telephone triage pregnancy cases (Table 1).

Table 1
Numbers in each SHRPW category and numbers of cases with other categories SHRPW, socially high-risk pregnant women; ANC, antenatal care;

		Young pregnant women	Mental illness	No ANC	Unmarried	Money matters	An emotional conflict	Multiple pregnancies	IPV	No issue	Out of touch	Lack of supporters	Fore nati
Telephone triage		183	88	80	56	47	23	16	16	15	14	13	10
Cases with other categories		33	13	52	36	36	16	3	7	13	14	13	0
Name and number of other categories	Young pregnant women	-	1	16	4	1	2	1	5	1	2	2	0
	Mental illness	1	-	0	5	7	4	1	1	0	2	0	0
	No ANC	16	0	-	12	21	3	0	0	11	3	6	0
	Unmarried	4	5	12	-	10	6	1	1	6	11	5	0
	Money matters	1	7	21	10	-	2	0	0	4	5	7	0
	An emotional conflict	2	4	3	6	2	-	0	0	0	1	0	0
	Multiple pregnancies	1	1	0	1	0	0	-	1	1	0	0	0
	IPV	5	1	0	1	0	0	1	-	0	1	0	0
	No issue	1	0	11	6	4	0	1	0	-	2	3	0
	Out of touch	2	2	3	11	5	1	0	1	2	-	7	0
	Lack of supporters	2	0	6	5	7	0	0	0	3	7	-	0
	Foreign nationality	0	0	0	0	0	0	0	0	0	0	0	-
	Report from police	4	0	0	0	0	0	0	0	0	0	0	0
	Attempted suicide	0	3	0	3	0	2	0	0	0	1	0	0
	Divorce	0	0	0	1	1	0	0	1	0	0	0	0

Out of 469 cases, 37 were excluded for the following reasons: 23 were planning to have an artificial abortion; 6 had temporary financial problems (money matters); 3 had uncertain gestational week (no ANC); 3 had mental illness but did not have a diagnosis from a psychiatrist (mental illness); 1 planned to divorce but had not divorced yet (divorce); and 1 reported unverified IPV (IPV).

The mean age, median age, and age range of SHRPW were 24.0, 22, and 14–47 years, respectively. There were 2 (0.5%) SHRPW who were 14 years old, 180 (41.7%) between ages 15 and 19 years, 77 (17.8%) between ages 20 and 24 years, 61 (14.1%) between ages 25 and 29 years, 49 (11.3%) between ages 30 and 34 years, 30 (6.9%) between ages 35 and 39 years, 12 (2.8%) between ages of 40 and 44 years, and 1 (0.2%) who was 45 years or older. There were 20 women (4.6%) with unknown ages.

The young pregnant women category, which was the largest category, included 183 cases. Two were 14 years old, 6 were 15 years old, 13 were 16 years old, 30 were 17 years old, 57 were 18 years old, 74 were 19 years old, and 1 was a second-year junior high school student (of unknown age). Thirty-three out of 183 cases had characteristics matching those of other simultaneous categories in addition to the young pregnant women category (Table 1). The mental illness category included 88 cases; of these, 25 had depression, 19 had a panic disorder, 11 had schizophrenia, 9 had epilepsy, 5 had sleep disorder and obsessive compulsive disorder, 4 had bipolar disorder and anxiety, 2 had borderline personality disorder, 1 woman each had posttraumatic stress disorder, dissociative disorder, dysthymia, an eating disorder, and postpartum depression. Furthermore, 15 women had an uncertain disease, and 11 had more than one mental illness. All pregnant women in the mental illness category underwent a regular pregnancy examination. The no ANC category included 80 cases; of these, 20 and 60 utilized the telephone triage during the second and third trimester of pregnancy, respectively. Seventy-three pregnant women did not undergo a pregnancy examination and seven pregnant women consulted an obstetrician only once during and after the second trimester of pregnancy. Forty-four women were primiparous, whereas 36 were multiparous; the highest number of deliveries was eight. Twelve of the deliveries among the women in the no ANC category occurred at home or in an ambulance. Of these, 3 women called just before the delivery, 3 women called during the delivery, and 6 women called just after the delivery. Two women delivered in the second trimester, whereas 10 women delivered in the third trimester. In two cases, the death of the baby was confirmed immediately after delivery at 29 weeks and 30 weeks of pregnancy, respectively.

The money matters category included 47 cases; of these, 22 cases received or applied for welfare payments. In the ‘an emotional conflict’ category, there were 18 cases in the first trimester, 4 cases in the second trimester, and 1 case in an unknown trimester. All 16 women with multiple pregnancies regularly consulted an obstetrician. Five of these cases required emergent requests for maternal transfer to a tertiary care hospital or specialist care from obstetricians.

The IPV category included 16 cases. All of these cases regularly consulted an obstetrician. Individuals who committed acts of violence were the husband in seven cases, the boyfriend in four cases, the common-law husband in one case, the father in one case, the mother in one case, and an unknown person in two cases. Two pregnant women were protected by the counseling and support center for women. In the no issue category, 4 cases were in the second trimester and 11 cases were in the third trimester. The foreign nationalities category consisted of 10 cases; none had other simultaneous categories. Among these 10 cases, two calls were placed by ambulance attendants, two by medical staff, two by husbands, two by members of a volunteer group, one by a mother-in-law, and one by a man of unknown relationship to the pregnant woman. Their nationalities were Chinese (four cases), Russian (one case), Ghanaian (one case), Thai (one case), Indian (one case), and unidentified (two cases). There were nine cases in the police report category, of which, four were also in the young pregnant women category. Of all SHRPW, 326 cases (75.5%) had a single category and 106 cases (24.5%) had other simultaneous categories (Table 1). These 106 cases had 48 patterns of co-occurring relationships between different categories.

As shown in Fig. 1, the strong co-occurring relationships and their Jaccard coefficients were as follows: out of touch and lack of supporters, 0.35; no ANC and money matters, 0.20; out of touch and unmarried, 0.17; no ANC and no issue, 0.13; money matters and lack of supporters, 0.13; no issue and lack of supporters, 0.12; and money matters and unmarried, 0.11. All Jaccard coefficients ranged from 0.01 to 0.35.

The top-ranked characteristic words (Table 2) in all 15 categories were not the same as the top-ranked words in any of the other categories: consultation (young pregnant women); mental (mental illness), no consultation (no ANC); unmarried (unmarried); welfare payments (money matters); artificial abortion (an emotional conflict); twins (multiple pregnancies); kick (IPV); unknown (no issue); parent (out of touch); father (lack of supporters); Japanese (foreign nationality); arrest (police report); suicide (attempted suicide); and opponent (divorce).

Table 2
Characteristic words of each SHRPW category and their Jaccard coefficients ANC, antenatal care; IPV, intimate partner violence

Non-SHRPW		Young pregnant women		Mental illness		No consultation	
pregnancy	0.17	consultation	0.03	mental	0.05	no consultation	0.04
consultation	0.1	say	0.03	disorder	0.04	emergency	0.04
genital bleeding	0.08	obstetrics and gynecology	0.03	internal use	0.03	fetal movement	0.04
hospital	0.07	genital bleeding	0.03	panic	0.03	rupture of the membranes	0.03
bleeding	0.06	last menstrual period	0.03	medicine	0.02	last menstrual period	0.03
say	0.06	telephone	0.02	hospital	0.02	labor	0.03
stomachache	0.06	emergency	0.02	treatment	0.02	labor pain	0.03
telephone	0.05	stomachache	0.02	say	0.02	unknown	0.03
talk	0.05	speak	0.02	last menstrual period	0.02	delivery	0.02
lower abdomen	0.03	pain	0.02	clinic	0.02	interval	0.02
Unmarried		Money matters		An emotional conflict		Multiple pregnancies	
unmarried	0.05	welfare payments	0.04	artificial abortion	0.03	twins	0.04
partner	0.03	partner	0.02	continuation	0.03	priority hospital	0.04
menstruation	0.02	money	0.02	delivery	0.02	affiliated hospital	0.03
last menstrual period	0.02	labor	0.02	get lost	0.02	city hospital	0.02
speak	0.02	no consultation	0.02	large amount	0.02	earache	0.02
emergency	0.02	last menstrual period	0.02	sister	0.02	incision	0.02
unknown	0.02	reason	0.02	unmarried	0.02	the other day	0.02
delivery	0.02	child	0.02	partner	0.02	contraction inhibitor	0.02
labor	0.02	labor pain	0.02	backache	0.02	heartbeat	0.02
continuation	0.02	pain	0.02	taking	0.02	acquaintance	0.02
IPV		No issue		Out of touch		Lack of supporters	
kick	0.04	unknown	0.02	parent	0.02	father	0.03
boyfriend	0.04	partner	0.02	disorder	0.02	transparent	0.02
police	0.03	countenance	0.02	family register	0.02	money	0.02
violence	0.03	labor	0.02	partner	0.02	parent	0.02
fall down	0.02	fetus	0.02	energy	0.02	sennoside®	0.02
husband	0.02	speak	0.02	fetus	0.02	vegetable	0.02
common-law	0.02	insurance	0.02	opponent	0.02	disregard	0.02
information	0.02	money	0.01	unknown	0.01	partner	0.02
opponent	0.02	umbilical cord	0.01	family	0.01	real mother	0.02
disorder	0.01	fetal movement	0.01	stomach	0.01	move	0.02
Foreign nationality		Report from police		Attempted suicide		Divorce	
Japanese	0.05	arrest	0.06	suicide	0.05	opponent	0.03
speak	0.04	detention	0.06	stability	0.04	beginning	0.03
immigration	0.02	police	0.04	family	0.04	marriage	0.02
listen	0.02	headquarters	0.03	wrist slitting	0.04	wheelchair	0.02
interpreter	0.02	incontinence	0.03	drug	0.04	pulse	0.02
afternoon	0.02	stimulant	0.03	tablet	0.04	slap	0.02

husband	0.02	name	0.03	police	0.03	health	0.02
digestion	0.01	detailed	0.02	sorry	0.03	divorce	0.02
principal	0.01	whole body	0.02	cry	0.03	application	0.02
cervical length	0.01	chill	0.02	mental	0.03	another	0.02

Discussion

Research findings to date have shown that preventive measures against child abuse could be taken by identifying the pregnant women at risk for abuse after childbirth.[2, 3, 10, 11] The Hawaii Healthy Start Program[10] uses a 15-item screening checklist during pregnancy for the early prevention of child abuse; if there is a possibility of a certain degree of risk, then trained paraprofessionals conduct home visits.[11] In Washington State, USA, an assessment of child abuse risk for a sample of 49 expectant mothers using the Brigid Collins Risk Screener at 3 months postpartum indicated that mothers at high risk had significantly lower scores for the quality of infants' physical, social, and emotional environments than mothers at moderate risk or low risk.[2] These surveys were performed by directly interviewing pregnant women; however, there is no study of a telephone triage for SHRPW. A strong co-occurring relationship between different SHRPW categories was found for seven pairings, and six categories of these seven pairings form the hexagonal network (i.e., the negative hexagon) shown in Fig. 1. Therefore, if a client who utilized the telephone triage has one of these categories, then it might be necessary to ask questions to determine whether she fits another category of the negative hexagon. Because the lack of supporters and money matters categories have shown a strong co-occurring relationship with the other three categories, these might be the key categories of the negative hexagon. Therefore, SHRPW, especially the pregnant women categorized in the negative hexagon, might require social support because they fulfill the criteria for the lack of supporters and money matters categories. If the coordinator suspects that the client is an SHRPW, then it is necessary to positively cooperate with other types of professionals so that the SHRPW can receive the proper social support. The no ANC category was the third most common category, followed by young pregnant women and mental illness. Because medical institutions and local governments cannot thoroughly determine the existence of women in the no ANC category, there is a high probability that the pregnant women in the no ANC category were found for the first time through the telephone triage.

However, among 80 cases in the no ANC category, there were 12 cases (15.0%) who called just before, during, and just after delivery; therefore, some pregnant women in the no ANC category were extremely difficult to find early during their pregnancy and therefore could not be offered the appropriate social support when they first needed it. Some research has been performed regarding the approaches to pregnant women who have only undergone a few consultations with an obstetrician (those at risk for no ANC)[12–15] and the "tobikomi" delivery.[16] However, there is no report of the overall picture of no ANC because medical institutions and local governments cannot thoroughly find and support pregnant women in the no ANC category. Because of the strong co-occurring relationship between no ANC and money matters, money matters was considered to be the major cause of no ANC.

In the United Kingdom, when pregnant women register for a general practitioner and use the National Health Service, they can undergo medical examinations for pregnancy at no cost.[17] In Japan, a portion of the medical fees is subsidized by the local government; however, to reduce the number of women in the no ANC category, it might be necessary to eliminate the fee for medical examinations for pregnancy. All SHRPW categories had words that were characteristic of each category. However, "rupture of membranes" and "labor" (no ANC) and "boyfriend" (IPV), which are words that seem irrelevant to the category, were actually the characteristic words. Pregnant women in the no ANC category who had no family doctor were in danger when they experienced rupture of membranes and labor. Because they utilized the telephone triage under these conditions, these words could be considered characteristic of no ANC. IPV affects adolescent girls and older adult women within formal unions when females marry young, and within informal partnerships such as dating relationships.[18] As shown in Table 1, the rate of young pregnant women in the IPV category was 31.3% (5 out of 16 cases), which was the highest after the police report category. Because of the high percentage of young women in the IPV category, "boyfriend" could be deemed as the characteristic word. As shown in Table 2, many young pregnant women talked about common symptoms during pregnancy, such as genital bleeding, stomachache, and pain. Therefore, "consultation" might be the characteristic word of young pregnant women, because they asked the coordinator about whether they should consult a doctor. In this study, a pregnant woman who was worried about or contemplating termination of the pregnancy was assigned to the 'an emotional conflict' category. Unintended pregnancy and emotional conflict are synonymous because the cause of worry is probably the unplanned pregnancy. Compared to intended pregnancies, unintended pregnancies have been associated with higher parenting stress,[19] higher risk of fostering situational abusive behavior,[19, 20] no discussion about raising the child with the husband or family, non-participation by the husband in raising the child, and increased symptoms of depression.[19, 21] IPV during pregnancy has been associated with an increased risk of preterm birth, low birthweight, small for gestational age status,[5] and suicidal ideation.[22] Zolotor et al.[23] found that approximately half of the homes where IPV occurred reported child maltreatment (CM), and nearly one-third of homes where CM had occurred had reported IPV, suggesting that IPV and CM are closely related phenomena with great importance in the lives of children and families. Alhusen et al.[22] stated that lack of comprehensive screening protocols and treatment initiatives during this time period leads to missed opportunities to improve the health and well-being of millions of women and children. The IPV category had 16 cases in the present study, which seems small compared to other categories. The reason for this may be that pregnant women do not want to actively speak about IPV and the telephone triage has not yet adopted IPV screening[24] for pregnant women. It has been suggested that the telephone triage will help find those in the no ANC category, which medical institutions and local governments cannot thoroughly accomplish, and in 'an emotional conflict' category, which includes clients who are reluctant to speak about their problems in public. Moreover, it is important for the telephone triage to adopt IPV screening for pregnant women, with the coordinator routinely inquiring about whether the pregnant woman has her maternal and child health handbook because the no issue category has a strong co-occurring relationship with the no ANC category. One limitation of this study was that it was difficult to judge who said which words. The description of the telephone triage conversations consisted of natural words expressed by the clients and the revised words described by the midwives who performed the triage. Because the midwives who

perform the telephone triage are deprived of the information provided by sight, smell, and touch, the telephone triage reduces the communication to that of a single sense—hearing.[25] Therefore, it is possible that the telephone triage might supply them with less information than the interview.

Abbreviations

ANC
Antenatal care
CM
Child maltreatment
IPV
Intimate partner violence
SHRPW
Socially high-risk pregnant women

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Review Committee of Hokkaido University Graduate School of Health Sciences (approval number: 16–81). Because the data are administrative information that are disclosed to anyone, we confirmed the view of Hokkaido's public health center (a telephone triage center) that informed consent from participants is not required for the use of data except for the name, address, and telephone number.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/ or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

KO performed the analysis of the database. TS supervised the analysis. KO drafted the manuscript with help from MI, HY, and HI. All authors were involved in writing the manuscript. All authors read and approved the final manuscript.

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Figures

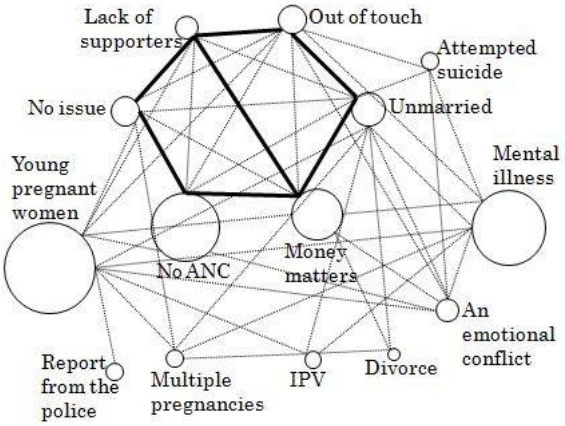

Figure 1

Co-occurring relationships between different SHRPW categories. The size of the circle indicates the number of cases. A thick line represents a Jaccard coefficient >0.1, which indicates an intense co-occurring relationship. ANC, antenatal care; IPV, intimate partner violence.