

Original Article

Determining the Nursing Students' Thoughts Regarding the Effect of Work Environment on the Health of Pregnant Nurses

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Abstract

Background: Pregnancy is a natural process and is a special period in women's life. Also, the gestation period is a special process that needs to be sensitive to multifactorial risk factors. In nursing education, the importance of professional risks in various courses is explained. In this way, an important step will be taken to prevent risks that may arise from reproductive health arising from the working environment.

Objective or Aims: The study aims to determine nursing students' views regarding the effect of work environment on the health of pregnant nurses.

Methodology: A descriptive study design was used. The study sample consisted of 143 third and fourth year nursing students studying in a state university in the 2017-2018 academic year. Data were collected using a "Questionnaire Form" prepared in accordance with the literature. Averages and percentages were used in data analysis.

Results: The mean age of the students was 21.31 ± 1.17 years and 67.1% of them were female. According to the students, the risks in the pregnant nurses' work environment arose from the intensity of radioactivity (74.1%), standing for long periods of time (68.5%), exposure to teratogenic drugs (65.7%). Students viewed health problems such as infectious diseases (96.5%) and depression (83.2%) to be related to the work environment of pregnant nurses.

Conclusions: Nursing students view the health of pregnant women as being affected by their work environment.

Keywords: Nursing students; Pregnant nurse; Work environment.

Introduction

The right to work in a healthy and safe environment is one of the most fundamental human rights. As work environments contain many risk factors that may affect employee health, institutions have to provide a safe environment to protect employees' health and take precautions for occupational diseases and

accidents (Aras and Uskun, 2015). While these measures help protect employee mental and physical health for a productive life, the measures also protect the family and social lives of individuals (Canbaz et al., 2005).

As in many professions, the healthcare sector has many physical, chemical, biological, psychosocial, ergonomic dangers and risks

(Parlar, 2008). Hospitals are work environments containing significant risks for employees. Among workforce groups, hospital workers constitute the group with the highest rate of work-related injuries and diseases (Ince, 2008). According to the Regulation of Workplace Hazard Classes on Occupational Health and Safety, health institutions in Turkey are among the higher risk groups in terms of occupational accidents and diseases (Official Newspaper, 2017). Health institutions serve the society through different professions. According to Turkish Statistical Institute (TÜİK)'s statistics for 2016-2018, 190,499 of 1,016,401 people working in health institutions are nurses (TÜİK, 2020). Nurses face various professional risks and dangers depending on the work unit and job requirements (Ulutasdemir et al., 2015). The nursing profession is dominated by females. Many risk factors in the nursing work environment and conditions affect woman's and fetal' health before, during and after pregnancy. These risk factors include: **physical** (high/low temperature, noise, ionizing/nonionizing radiation, high/low pressure etc.), **chemical** (chemotherapeutic drugs, formaldehyde, ethylene oxide, etc.), **biological** (laboratory materials containing blood, infected body tissue and fluids, or bacteria, viruses, parasitic diseases, organic powders, proteins, enzymes, etc. from medical waste); **psychosocial** (stress, etc.), **ergonomic** (heavy lifting, repetitive movements, movements such as reaching, pulling, and turning, prolonged or intense focus, situations requiring quick perception, posture/position during work, etc. (Kahya and Özkar, 2014; Yazıcı and Kalaycı, 2015; Lawson et al., 2019). Pregnancy is a natural process and a unique period in a women's life. This unique period requires sensitivity against multifactorial risk factors. Studies have found that the work environment and conditions affect reproductive health (Villar et al., 2019; Williams and Fletcher, 2010; Lee et al., 2017; Hansen et al., 2015; Lee and Jung, 2012; Alex, 2011). Therefore, women who are pregnant or want to conceive should be careful about the risks arising from the work environment. Health institutions have to provide the environment required by law and raise employee awareness (Ulutasdemir et al., 2015). Risks during pregnancy include lifestyle (diet, physical activity), medical history (diseases, obstetrical history), work risks (physical, chemical and biological), safety (falls, damages) ergonomic (physically demanding work), and/or

psychosocial factors (excessive demands, shift work, weekend work, little control). These risk factors threaten maternal and fetal health and can cause serious complications when the necessary precautions are not taken (Villar et al., 2019; Celikkalp and Yorulmaz, 2017). Pregnant women should be considered an at-risk group. Protecting woman and children's' health is necessary for sustaining healthy communities (Celikkalp and Yorulmaz, 2017). Protecting women's reproductive health includes protection of partners, children, and consequently family and community health (Ilcioglu, Keser and Cinar, 2017). Globally, nurses are at risk in terms of job security from lower job satisfaction and work environments (Zhang et al., 2014). Nursing students should be educated about occupational health and safety and awareness raised about workplace hazards. Pregnant nurses' health risks in the work environment should be included in the nursing curriculum of occupational health and safety. This is an important step towards identifying and preventing risks related to reproductive health arising in the working environment (Canbaz et al., 2005; Ortaylı, 1999). There are no studies directly conducted on this subject with nursing students in Turkey or abroad. This study aimed to determine nursing students' opinions regarding the effect of work environment on the health of pregnant nurses.

Research question and hypothesis

Study questions were:

1. How are students' socio-demographic characteristics distributed?
2. What are the students' views on the risks towards pregnant nurses' arising from the work environment?

Materials and Methods: A descriptive study design was used. The study population consisted of all third and fourth year nursing students (N=252) studying in a state university in the 2017-2018 academic year. The study sample consisted of 143 students who volunteered to participate in the research. First and second year students who were not studying women's health and diseases and occupational health and safety were excluded from the study. The criteria to be included in the study:

1. Being a third or fourth year student
2. Having an understanding about women's health and occupational safety

3. Volunteering to participate in the study

The data were collected using "Questionnaire Form" was prepared by the researchers in line with the literature. The Questionnaire Form consisted of 13 questions in total, 7 questions about the demographic data of students, and 5 questions about students' opinions regarding the effect of work environment on the health of pregnant nurses. Study data were collected in approximately 15 minutes.

Ethical Consideration: Ethics Committee approval was obtained from a State University Health Sciences Research and Publication Ethics Committee (Approval no: 2018/675-34) and continued in accordance with the Helsinki Principles Declaration. All the students were informed about the study both verbally and in written. Informed consent was signed by all participants.

Data Analysis: Data were analyzed using SPSS 22.0 software package. Averages and percentages were used in the assessment.

Results

Table 1 shows the students' socio-demographic characteristics. The mean age of the students in

the study was 21.31 ± 1.17 years. Of them, 67.1% were women, 57.3% spent most of their life in a city, 41.3% were from Marmara Region. Of the students, 77.6% had nuclear families, 61.5% had equal income and expenses and 91.6% had social security.

Table 2 presents the work areas students identify as high-risk for pregnant nurses and distribution of risk levels. The most high-risk internal clinics were infection (79.7%), radiology (65%), radiation oncology (62.2%), chemotherapy (42%), oncology (28.7%) and hematatology (21%); the highest-risk surgical clinics were intensive care (41.3%), operating room (17.5%) and general surgery (4.2%); and the highest-risk area among the child health and diseases clinics was child psychiatry clinic (10.5%). The highest-risk emergency units were adult emergency departments (9.1%) and the highest-risk areas among other units were blood collection units (13.3%). Internal/surgical intensive care units (23.1%), chemotherapy (18.9%) and radiation/oncology (15.4%) units carried high and very high risks in terms of the health of pregnant nurses.

Table 1. Distribution of Students' Socio-Demographic Characteristics (N=143)

Characteristic		N	%
Age	Mean \pm SD: 21.31 ± 1.17 Min-Max: 19-25		
Gender	Female	96	67.1
	Male	47	32.9
Longest place of residence	City	82	57.3
	District	37	25.9
	Village	24	16.8
Region of residence	Marmara	59	41.3
	Aegean	10	7.0
	Central Anatolia	13	9.1
	Black Sea	24	16.8
	Mediterranean	9	6.3
	Eastern Anatolia	16	11.2
	Southeastern Anatolia	12	8.4
Family type	Nuclear family	111	77.6
	Extended family	25	17.5
	Parents are separated	7	4.9
Family income status	Income more than expenses	49	34.3
	Income equal to expenses	88	61.5
	Income less than expenses	6	4.2
Social security	Present	131	91.6
	None	12	8.4

Data were presented as mean \pm SD and percentage (%)

Table 2. Work Areas Students Consider to be High-Risk for Pregnant Nurses and the Distribution of Risk Levels (N = 143)

Clinic Name	Risk				Level of Risk							
	Present		None		Very low		Low		High		Very high	
	n	%	n	%	n	%	n	%	n	%	n	%
Internal clinics												
Infection	114	79.7	29	20.3	65	45.5	30	21.0	12	8.4	7	4.9
Radiology	93	65	50	35.0	50	35.0	7	4.9	11	7.7	7	4.9
Radiation/Oncology	89	62.2	54	37.8	51	35.7	16	11.2	12	8.4	10	7.0
Chemotherapy	60	42	83	58.0	24	16.8	9	6.3	19	13.3	8	5.6
Oncology	41	28.7	102	71.3	11	7.7	9	6.3	11	7.7	10	7.0
Hematology	30	21.0	113	79.0	7	4.9	5	3.5	7	4.9	7	4.9
Adult Psychiatry	18	12.6	125	87.4	0.0	0.0	3	2.1	3	2.1	3	2.1
Cardiology	15	10.5	128	89.5	9	6.3	2	1.4	3	2.1	1	0.7
Delivery room	9	6.3	134	93.7	2	1.4	0.0	0.0	4	2.8	3	2.1
Dialysis	6	4.2	137	95.8	1	0.7	1	0.7	1	0.7	3	2.1
Dermatology	6	4.2	137	95.8	0.0	0.0	2	1.4	1	0.7	3	2.1
Physiotherapy	5	3.5	138	96.5	1	0.7	1	0.7	2	1.4	1	0.7
Neurology	4	2.8	139	97.2	1	0.7	1	0.7	1	0.7	1	0.7
Pulmonology	3	2.1	140	97.9	1	0.7	1	0.7	0.0	0.0	1	0.7
Endocrinology	2	1.4	141	98.6	1	0.7	1	0.7	0.0	0.0	0.0	0.0
Rheumatology	1	0.7	142	99.3	0.0	0.0	1	0.7	0.0	0.0	0.0	0.0
Gynecology and Obstetrics	1	0.7	142	99.3	1	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Nephrology	1	0.7	142	99.3	1	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Otorhinolaryngology	0	0	143	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Surgical clinics												
Surgical / Internal Intensive Care	59	41.3	84	58.7	20	14.0	21	14.7	21	14.7	12	8.4
Operating Room	25	17.5	118	82.5	1	0.7	7	4.9	7	4.9	10	7.0
General Surgery	6	4.2	137	95.8	0.0	0.0	2	1.4	1	0.7	3	2.1
Cardiovascular Surgery	4	2.8	139	97.2	2	1.4	1	0.7	1	0.7	0.0	0.0
Orthopedics	1	0.7	142	99.3	1	0.7	0.0	0.0	0.0	0.0	0.0	0.0
Pediatrics												
Child Psychiatry	15	10.5	128	89.5	7	4.9	1	0.7	4	2.8	3	2.1
Pediatrics	7	4.9	136	95.1	3	2.1	2	1.4	2	1.4	0.0	0.0
Emergency Services												
Adult Emergency Service	41	28.7	102	71.3	7	4.9	13	9.1	8	5.6	13	9.1
Child Emergency Service	17	11.9	126	88.1	1	0.7	3	2.1	7	4.9	6	4.2
Other units												
Blood Collection	19	13.3	124	86.7	1	0.7	3	2.1	8	5.6	8	5.6
Polyclinics	4	2.8	139	97.2	1	0.7	0.0	0.0	0.0	0.0	3	2.1

Data were presented as frequency (n) and percentage (%)

Table 3. Distribution of Students' Thoughts Related to Risks Arising from the Work Environment of Pregnant Nurses (N = 143)

Factor	Effect				Impact Level							
	Present		None		Very low		Low		High		Very high	
	n	%	n	%	n	%	n	%	n	%	n	%
Radioactivity intensity	106	74.1	37	25.9	37	25.9	11	7.7	6	4.2	7	4.9
Standing for long periods of time	98	68.5	45	31.5	36	25.2	29	20.3	21	14.7	12	8.4
Preparing teratogenic drugs	94	65.7	49	34.3	67	46.9	12	8.4	7	4.9	8	5.6
Characteristics of the working service	78	54.5	65	45.5	45	31.5	14	9.8	8	5.6	11	7.7
Working night shifts	65	45.5	78	54.5	21	14.7	22	15.4	12	8.4	10	7.0
Number of patients per nurse	56	39.2	87	60.8	8	5.6	11	7.7	21	14.7	16	11.2
Long working Hours	44	30.8	99	69.2	8	5.6	13	9.1	10	7.0	13	9.1
Job Type	42	29.4	101	70.6	6	4.2	8	5.6	14	9.8	14	9.8
Lack of a suitable place for rest breaks	33	23.1	110	76.9	5	3.5	6	4.2	7	4.9	15	10.5
Low number of nurses	23	16.1	120	83.9	3	2.1	7	4.9	8	5.6	5	3.5
Inconvenient schedules	14	9.8	129	90.2	2	1.4	3	2.1	6	4.2	3	2.1
In-team communication problems	6	4.2	137	95.8	1	0.7	1	0.7	1	0.7	3	2.1

Data were presented as frequency (n) and percentage (%)

Table 4. Distribution of Students' Opinions on Pregnant Nurses' Health Problems Related to Work Environment (N = 143)

Health Problem	Yes		No	
	n	%	n	%
Infectious Diseases	138	96.5	5	3.5
Depression	119	83.2	24	16.8
Allergies	71	49.7	72	50.3
Vascular diseases	70	49.0	73	51.0
Skin problems	66	46.2	77	53.8
Stomach-intestinal problems	51	35.7	93	64.3

Data were presented as frequency (n) and percentage (%)

Table 3 shows the most frequent risks arising from the pregnant nurses' work environments according to the students. According to the students the most frequent risks arising from the pregnant nurses' work environments were radioactivity intensity (74.1%), standing for long periods of time (68.5%), exposure to teratogenic drugs (65.7%), characteristics of the service they worked in (54.5%), and working night shifts (45.5%).

The factors that carried the highest level of risk for the pregnant nurses included in Table 3: patient per nurse (11.2%), lack of suitable environment for rest breaks (10.5%), job type (9.8%), long working hours (9.1%), and standing for long periods of time (8.4%).

Table 4 shows the most common health problems in pregnant nurses according to the nursing students. The most common health problems in pregnant nurses were infectious diseases (96.5%) and depression (83.2%).

Discussion

Nurses, who constitute a large part of the healthcare workforce, face various health risks in the workplace. They are exposed to risks such as night work, exposure to infectious diseases, medication, radiation, physical environment conditions (such as slippery ground) and their health is negatively affected. There is a two-way interaction between the health of the employee and the work environment. Health affects work life and work life affects health (Ceylan and Beser, 2009).

While the risks in the hospital environment differ depending on work units, nurses face various biological, chemical, physical, environmental, psycho-social and biomechanical risks, and when safety measures are not taken, these risk factors threaten both the pregnant nurse and the health of the fetus (Celikkalp and Yorulmaz, 2017; Yenal and Durgun, 2013). The areas that students considered as high-risk for pregnant nurses to work in were the infection (79.7%), radiology (65%), radiation oncology (62.2%), chemotherapy (42%), oncology (28.7%) and hematology (21%) clinics. The students thought that the units where the pregnant nurses' risk levels were high and very high were the internal/surgical intensive care units, radiation/oncology and chemotherapy units, respectively (Table 2). Various studies have shown that the work environment is a factor

affecting the health of nurses (Aras and Uskun, 2015; Wu et al., 2018; Kesgin and Kublay, 2011; Muñoz-Hernández, Boné-Pina and Pérez-Permán, 2011). In their study, Muñoz-Hernández et al. (2011) stated that the most important occupational risks affecting nurses were physical (ionizing radiation), biological and ergonomic risks (Muñoz-Hernández, Boné-Pina and Pérez-Permán, 2011).

Because nurses spend more time with the patient and provide care directly, they are more likely to encounter health risks than other healthcare personnel (Parlar, 2008). Many factors, such as the characteristics of the unit worked the characteristics of the patients, or the methods of diagnosis and treatment administered, determine the risk factors that nurses may encounter (Alcelik et al., 2005). Pregnancy, which is a special period in a women's life, requires sensitivity against multifactorial risk factors. Studies found that the working environment and conditions affect reproductive health (Villar et al., 2019; Williams and Fletcher, 2010; Lee et al., 2017; Hansen et al., 2015; Lee and Jung, 2012). The students in our study thought that the most frequent risks arising from the pregnant nurses' working environments were radioactivity intensity (74.1%), standing for long periods of time (68.5%), exposure to teratogenic drugs (65.7%), characteristics of the service they worked in (54.5%) and working night shifts (45.5%) (Table 3). Nurses working in intensive care, emergency services, child health and diseases and oncology departments have a high potential for radiation exposure. The effect of radiation during pregnancy depends on the stage of development of the fetus. Depending on the stage; stillbirth, intrauterine growth retardation, neurological problems (microcephaly, mental retardation, paralysis) and congenital defects might be observed (Celikkalp and Yorulmaz, 2017). A study by Williams and Fletcher (2010) found that pregnant women exposed to high doses of radiation may experience spontaneous abortion, intrauterine growth retardation and give birth to a neonate with mental retardation. No matter the dose, radiation also increases the risk of cancer (Williams and Fletcher, 2010).

Healthcare workers encounter various chemical hazards and risks associated with the work environment. These chemicals (anesthetic gases, chemotherapeutic agents, iodine compounds, solutions, cytostatic drugs, disinfectants, antiseptics, liquids used during sterilization

processes, ethylene oxide, dyes and solvents, ethyl alcohol and its derivatives, formaldehyde and latex products), are used during professional practices with varied frequency of use according to the units, and have teratogenic properties. Nurses may be exposed to these chemical hazards at a high or low level during the preparation, transportation, application, storage and disposal of antineoplastic drugs through inhalation or direct contact with the skin and spontaneous abortion, preterm birth and stillbirths can occur as a result of this exposure (Celikkalp and Yorulmaz, 2017). Another study has shown that nurses preparing and administering antineoplastic drugs have occupational potential risks related to reproduction, whether pregnant or not (Fransman et al., 2007). In the same study, exposure to antineoplastic drugs was found to affect fertility and neonatal health (preterm and low birth weight neonates) (Fransman et al., 2007). In a study by Hemminki, Kyyronen and Lindbohm (1985) cytotoxic drugs were not found to increase the risk of spontaneous abortion in pregnant nurses but caused malformation in infants (Hemminki, Kyyronen and Lindbohm, 1985). Despite these health risks, a study by Lawson et al. (2019) found that 7% of pregnant nurses administer antineoplastic drugs in the first 20 weeks of pregnancy. The study by Lawson et al. (2019) stated that contact with chemicals used in sterilization increased the risk of preterm labor (Lawson et al., 2019).

Nursing includes stress-related risk factors such as long working hours, excessive workload, time pressure, difficult or complex tasks, insufficient rest breaks, monotony and poor physical work environment (such as location, temperature and lighting). Nurses stand for long periods of time and experience insomnia with shift work and nutritional irregularities depending on the intensity of service and unit (Alcelik et al., 2005). Nurses lift and turn patients, stand for long periods of time and constantly repeat these practices as a part of their duty (Celikkalp and Yorulmaz, 2017). Lifting heavy objects to provide health care and improper posture may cause the pregnant nurses to experience preterm labor and spontaneous abortion (Celikkalp and Yorulmaz, 2017). Additionally, nurses working in services where biological risk factors are high will have a higher risk of being affected. The studies by Demir et al. (2014) and Kilinc et al. (2000) have found that those working in chest

diseases clinics are exposed to a higher risk of tuberculosis than those working in other clinics (Demir et al., 2014; Kilinc et al., 2000). Intensive Care Units also carry a high risk of infections (Erden, Bayrak Kahraman and Bulut, 2015).

Stress and work pressure are experienced more severely in the intensive care units where patients' conditions are critical, mortality rate is higher than other units, workload is high, and employees have to work with complex technological devices (Erden, Bayrak Kahraman and Bulut, 2015; Uzen et al., 2015). Studies conducted with intensive care nurses found their job stress scores to be high (Erden, Bayrak Kahraman and Bulut, 2015; Dede and Cinar, 2015). Psychosocial risk factors arising from the workplace increase the complications of pregnancy, birth, postpartum and negatively affect the health of the neonate (preterm labor, preeclampsia, difficult delivery, needing more surgical intervention at birth, small fetus according to gestational week, low birth weight and low apgar scores, etc.) (Yıldız, 2011).

Nurses work rotating shifts to provide patient care continuously. However, shift work disrupts the daily rhythm of a person and causes physical, mental and social health problems (Ozvurmaz and Oncu, 2018). Various studies including nurses found that working in shifts causes problems such as disrupted sleep pattern (Ozvurmaz and Oncu, 2018; Zverev and Misiri, 2009) decrease in work performance (Ozvurmaz and Oncu, 2018; Zverev and Misiri, 2009; Suzuki et al., 2005) attention deficit (Ozvurmaz and Oncu, 2018) and decreased cognitive functions (Ozdemir et al., 2013). Furthermore, a meta-analysis conducted by Mozurkewich et al. (2009) found a higher risk of uterine contraction, preterm labor, hypertension and preeclampsia and an increased risk of low birth weight baby in pregnant women working rotating shifts (Mozurkewich et al., 2009). In studies conducted with non-pregnant nurses, 67.2% to 92% of the nurses worked in a shift rotation (day and night) (Ozvurmaz and Oncu, 2018; Uzen et al., 2015). In other studies, between 65.2 % and 80% of the female healthcare workers were found to be on night duty during their pregnancies and the mean number of monthly shifts varied between 6.8 and 7.2 (Canbaz et al., 2005; Ortaylı, 1999). Such working conditions clearly affect the health of pregnant nurses and the fetus. A study conducted by Yorulmaz and Celikkalp (2017) determined

that nurses thought the reason for the spontaneous abortion experienced by the majority of nurses to be the characteristics of the work environment and occupational risk factors (Celikkalp and Yorulmaz, 2017).

Health institutions are rich in infections. Nurses and nursing students spending time with patients in health institutions often come into contact with these infectious agents during care practices (Parlar, 2008). This contact may occur due to the failure to take protective measures during the administration of care to the patient with infectious disease such as cutting and piercing injuries and improper waste management (Akca, 2008). Influenza-like respiratory diseases, which are especially common in autumn and winter, can be easily transmitted to pregnant nurses due to nurses' close contact with patients and working in closed environments. An infection may cause severe disease, hospitalization, and even death in the pregnant women due to the physiological changes in their immune, cardiovascular and respiratory system (Yenal and Durgun, 2013). Exposure to biological risk factors in the work environment may result in health problems which may affect both mother and child's health. These problems include anemia, spontaneous abortion, low birth weight, birth defects and transmissible infancy cancers during pregnancy and lactation (Celikkalp and Yorulmaz, 2017). In the present study, nursing students stated infectious diseases to be the most important health problem that may be observed in pregnant nurses due to the working environment (Table 4). In the study of Babayigit, İlhan and Oysul (2016), medical students indicated contagious diseases (32.6%) to be the most common risk affecting employees' health in hospitals (Babayigit, İlhan and Oysul, 2016). In our study students stated that depression was another significant health problem that may be observed in pregnant nurses due to work environment (Table 4). In various studies conducted with nurses, psychosocial risks were found to be among the most common risks in the work environment (Aras and Uskun, 2015; Wu et al., 2018). According to the literature, depression during pregnancy is a significant mental health problem affecting both mothers and children. The frequency of depression/depressive symptoms during pregnancy varies between 12% and 36%. Depression during pregnancy can cause obstetrical complications such as preterm birth, pre-eclampsia, difficult birth, newborn

with low birth weight and low Apgar score and increase in the risk of postpartum depression (Calık and Aktas, 2011).

The findings of this study were discussed using the literature and other studies on nurses as there are no studies directly conducted on the subject with nursing students in Turkey and abroad. The findings of the present study were in line with the literature and research findings.

Conclusions: Students determine the occupational risks of pregnant nurses based on the acquisition of knowledge from the vocational theoretical courses and the knowledge and experience they gain in clinical practice. Study results are important in terms of raising awareness about the dangers of the work environment and developing behaviors. The subject should be emphasized in all vocational courses to increase student awareness of occupational hazards to protect themselves and their colleagues' health especially during pregnancy.

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