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# Effect of mother's knowledge on posteducation toward rehospitalization of young children with pneumonia†

**Original Article**

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**Abstract:** **Objective:** The rehospitalization rate of children <5 years old with pneumonia is still high. The risk of hospitalization becomes higher in mothers with low knowledge of their child's disease. The purpose of this study was to determine the effect of post–health-education maternal knowledge in cases of rehospitalization and to determine the differences in rehospitalization rate based on the type of health education media.

**Methods:** This study is a quasi-experiment. Health education was given to both groups: one group received education through audiovisual media and the other group through leaflet media. The level of post–health-education knowledge was measured on the third day, then followed up until the 30th day after the patient was discharged from the hospital.

**Results:** Post–health-education knowledge significantly reduced the cases of rehospitalization in both groups. However, the rehospitalization rate in the audiovisual group was lower than in the leaflet group ($P = 0.047$, odds ratio = 5.870).

**Conclusions:** Post–health-education knowledge is effective in reducing the risk of rehospitalization, and health education using audiovisual media is more effective, compared to health education using leaflets, in reducing the cases of rehospitalization in children <5 years of age with pneumonia.

**Keywords:** *children • mother's post–health-education knowledge • pneumonia • rehospitalization*

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## 1. Introduction

Pneumonia is the main cause of death among young children in developing countries.[1] It was reported that 64% of children with severe pneumonia were in 15 developing countries, one of them Indonesia.[2] Moreover, 36.9% of children aged 1–4 years who were treated for lower respiratory tract infections will get rehospitalized.[3]

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Pneumonia ranked second among the rehospitalization cases, following heart disease, and the rehospitalization rate of pneumonia within 30 d after discharge from hospital was 20.1%.[4] Another study showed that prevelance of rehospitalization in children was 6.5%, of which 39% happened before the seventh day after discharge and 61.6% happened before the 14th day.[5] Among the 18.3% rehospitalized children, 87.5% had 1 rehospitalization, 9.7% had 2 rehospitalizations, and 2.8% underwent rehospitalization >3 times within 30 d after discharge from hospital. Further, 30% of rehospitalizations started on the 16th day after the child was discharged from the hospital, and the fastest rehospitalization occurred within on 12 days.[6]

Rehospitalization is caused by many factors; one of them—the most causative factor—is the lack of mother's knowledge, because the problem arises when a patient who has been declared cured goes home but returns back to the hospital to be treated for the same previous problem. The child that needs treatment again for the same cause within 30 d after cure and discharge is rehospitalized.[7] The negative effect of hospitalization on parents will exist up to 3 months after treatment; 25% (27 of 107) of parents whose children are treated in non–intensive care rooms will still be in trauma.[8]

One of the possible causes of rehospitalization is the lack of empowerment. The empowerment in a family in many hospitals in Indonesia is still not popular in the society, especially in the case of families of children with pneumonia; so, the better knowledge and skills, as well as the earlier detection of pneumonia, for families are needed.[9] Family empowerment is related to the patient's discharge process. The process of returning patients must be considered carefully, especially health education regarding the obligation of patients at home. According to a study, 27% of pneumonia patients will return to the hospital (rehospitalization) due to the low preparation for discharge.[10]

Based on the aforementioned phenomenon, it is clear that health education for mothers of children <5 years of age is required from the beginning of the child's hospitalization in order to reduce the risk of rehospitalization. This study did advanced assessment of interventions that have been made earlier (Casman, Nurhaeni, and Waluyanti),[11] where all respondents were given health education for 3 d. Health education starts with the mother from the children's first day until the third day of admission to the hospital. Health education is a part of discharge planning to improve the mother's knowledge. The research question is whether the health education provided to mothers who care for children during hospitalization for pneumonia reduces the risk of rehospitalization in children <5 years of age. The purpose of this study was to determine the effect of post–health-education knowledge on rehospitalization rates and to find out the differences in rehospitalization cases after mothers received health education using audiovisual and leaflet methods.

# 2. Methods

## 2.1. Study design, sample, and instrument

This study adopted a quasi-experimental approach. Data were collected in 4 inpatient rooms for children in 3 general hospitals (RSUD Koja, RUSD Pasar Minggu, and RSUD Pasar Rebo) of the Jakarta region (March–June 2019). All hospitals have equal national accreditation (B for good) and the highest prevalence of pneumonia cases of children <5 years old in Jakarta. All children <5 years of age who were admitted to one of the 3 hospitals for pneumonia and their mothers were included in this study. A minimum sample of 64 respondents was obtained based on the formula used in a previous study. The sample included 64 respondents (mothers of children <5 years old who have pneumonia); 32 of these were assigned to the leaflet group and 32 to the video group. Samples were selected by using consecutive random sampling, based on defined inclusion and exclusion criteria. The inclusion criteria were as follows: Mothers (a) whose children were admitted and hospitalized due to pneumonia since the first day in a month or for 30 d; (b) wherein, the child's diagnosis must not have severe complications (e.g., congenital heart defect, malnutrition, neurological disorders, pleural effusion, and all classification of special needs children); (c) who are willing to be the respondents of this study and who signed the consent form; (d) who can read, write, and speak proper Indonesian; and (e) who have a mobile phone to access the video. The exclusion criteria were as follows: Mothers (a) who decided to discharge their child of their own volition before the child fully recovered or discharged the child on the second day of hospitalization; (b) whose children died during hospitalization; (c) whose children had a deteriorating condition (had respiratory failure) during hospitalization and required intensive care; and (d) whose children were referred to another hospital. After the selection of participants, the mother completed the informed consent form before data collection using questionnaires was conducted. This study is part of the same research conducted by Casman et al.[11]

A respondent—during her 3-d-stay in the hospital—was given health education twice per day. The health education session lasted for a minimum duration of 10 min. On the last day, the respondents were

asked to fill out posttest questionnaires without looking at the education media as a post–health-education assessment. The video, as an instrument of health education, was valid and reliable. Validity and reliability tests were conducted in one general hospital in February 2019 with 30 mothers who had experience taking care of children with pneumonia. The questionnaires adopted were considered valid and reliable ($P > 0.6$), and the posttrial video of 5 min and 43 s was approved by two pediatric nursing experts.[11] The mother and child were observed until discharge from the hospital. Before the patient was discharged from the hospital, the researcher ensured that the mother in the audiovisual group kept the video on her smartphone, and mothers in the leaflet group confirmed to bring leaflets when they went back home. It is expected that both types of media are accessible by mothers in order to find information sources to care for children at home. After the child was discharged from the hospital, the child was monitored for up to 30 d. This is to determine the rehospitalization cases in children. The rehospitalization confirmation was conducted by the mother (the mother would inform the researcher when her child was hospitalized with recurrent pneumonia cases), and every week (every 7 d), the researcher conferred with the mother about her child's condition through Whatsapp application.

## 2.2. Data analysis

The data analysis in this study used univariate and bivariate approaches. Univariate data display the respondents' characteristics; the data are presented in frequency and percentage, while numerical data are presented as mean and standard deviation (or median and minimum–maximum [min–max]) values. Bivariate analyses used the Mann–Whitney test to determine the effect of post–health-education knowledge on rehospitalization and the chi-square test to determine the differences in rehospitalization rate between audiovisual and leaflet groups.

# 3. Results

The distribution of the respondents according to mother, child, and environmental characteristics is shown in Table 1. The average age of the participants in the leaflet group was higher (30.66 years) than in the audiovisual group (30.09 years). Meanwhile, the youngest participant was in the leaflet group, namely, 17 years old; and the oldest—43 years old—was in the audiovisual group. On average, the sample contained 2-year-old toddlers. The median of post–health-education knowledge in the audiovisual group was higher (median = 22), compared with that in the leaflet group (median =19). The gender of the children in this study was similar, e.g., the ratio of males to females was 1:1 in the leaflet group. Most of them were mothers with high education, having graduated from high school, and >50% of the mothers were not working. Up to 59.4% of families had >7 members at home (crowded home). However, the number of families with >2 children sleeping in a room was still higher, namely, 46.9% in the audiovisual group and 53.1% in the leaflet group (see Table 1).

Knowledge of health education in the mother after using audiovisual media (compared with using leaflets) significantly interferes with rehospitalization for pneumonia in children, with $P < 0.05$ (see Table 2), and there is a significant difference between the rehospitalization cases in the audiovisual group compared with the same in the leaflet group, with $P < 0.05$ (see Table 3).

| Variables | Group | |
|---|---|---|
| | Video ($n$ = 32) | Leaflet ($n$ = 32) |
| Mother's characteristics | | |
| *Age, in years (mean ± SD)* | 30.09 ± 6.664 | 30.66 ± 6.714 |
| *Education (f; %)* | | |
| Higher | 9; 28.1 | 8; 25 |
| Secondary | 16; 50 | 15; 46.9 |
| Primary | 7; 21.9 | 9; 28.1 |
| *Job (f; %)* | | |
| Unemployed | 21; 65.6 | 26; 81.2 |
| Employed | 11; 34.4 | 6; 18.8 |
| *Post–health-education knowledge (median ± min–max)* | 22 ± 14–22 | 19 ± 12–24 |
| Children's characteristics | | |
| *Age, in months (mean ± SD)* | 27.59; 14.979 | 26.63; 14.812 |
| *Sex (f; %)* | | |
| Male | 18; 56.2 | 16; 50 |
| Female | 14; 43.8 | 16; 50 |
| *Rehospitalization (f; %)* | | |
| Yes | 2; 6.2 | 9; 28.1 |
| No | 30; 93.8 | 23; 71.9 |
| Environmental characteristics | | |
| *Occupancy density (f; %)* | | |
| Rare | 17; 53.1 | 15; 46.9 |
| Dense | 15; 46.9 | 17; 53.1 |
| *Neighborhood density (f; %)* | | |
| Rare | 24; 75 | 21; 65.6 |
| Dense | 8; 25 | 11; 34.4 |

*Note*: f, frequency; max, maximum; min, minimum; SD, standard deviation.

**Table 1.** The distribution of respondents according to mother, children, and environmental characteristics.

| Variable | *f* | Mean rank | *P*-value* |
|---|---|---|---|
| *Audiovisual education* | | | 0.017 |
| Rehospitalization | 2 | 1.50 | |
| No | 30 | 17.50 | |
| *Leaflet education* | | | 0.002 |
| Rehospitalization | 9 | 8.22 | |
| No | 23 | 19.74 | |

*Note*: f, frequency; *Mann–Whitney test, significant $\alpha$ <0.05.

**Table 2.** The effect of post–health-education knowledge on rehospitalization (N = 64).

| Group | Rehospitalization | | 95% CI | OR | *P* Value |
|---|---|---|---|---|---|
| | No | Yes | | | |
| Audiovisual | 30 | 2 | 1.155–29.826 | 5870 | 0.047* |
| Leaflet | 23 | 9 | | | |

*Note*: CI, confidence interval; OR, odds ratio.
*Chi-square test, significant $\alpha$ <0.05.

**Table 3.** The difference in rates of rehospitalization cases (N = 64).

# 4. Discussion

The rehospitalization cases comprised 11 children (34.4%); the leaflet group had 9 children <5 years of age (28.1%), and in the audiovisual group, 2 (6.3%) children <5 years of age experienced rehospitalization. There were 9 rehospitalization cases in the leaflet group, which happened more frequently in the second week, with 5 children being <5 years of age. Rehospitalization in the leaflet group started in the first week of Day 7, while in the audiovisual group, 2 children underwent rehospitalization on Days 14 and 21. The results of this study (see Table 2) indicate that the rehospitalization rate is better than in previous studies; previous studies have explained that pneumonia is the main cause of hospitalization in children <5 years of age undergoing rehospitalization within 30 d after the child has recovered; the rehospitalization rate due to pneumonia is 22.6%.[12]

The result of this study indicates that post–health-education knowledge in both groups affects the risk of rehospitalization. In the leaflet group, post–health-education knowledge after using leaflets significantly reduced the rehospitalization cases ($P$ = 0.002), and post–health-education knowledge in the audiovisual group had a positive effect in reducing the risk of rehospitalization events ($P$ = 0.017). Assessment of the average post–health-education knowledge in both groups showed that the mother's knowledge is good (above average; i.e., 75% correct answers = 18 out of 24 questions); so, it will improve the chances for the mothers to care for their children better at home. Based on this study, high knowledge reduces the risk of rehospitalization. Audiovisual media and leaflets, which were used to impart knowledge to mothers from the first day of entry to the hospital until leaving the hospital, were part of the discharge planning.

The study of discharge planning shows that this approach is able to improve the ability of mothers to care for their children at home 7.5 times better than mothers who did not get discharge planning ($P$ = 0.004).[13] The success of implementing child care at home after returning home is related to the mother's performance in caring independently.[14] Mothers need good home return planning after hospitalization of their children. Planning for a good return significantly reduces the complications of the disease, prevents recurrence, and reduces mortality and morbidity in patients with pneumonia.[15] This view is supported by nurses, whereby 76% of nurses agree that the discharge planning process must be conducted from the first day that the patient is treated.[16] Return planning must involve the mother as the parent who plays an important role in providing care when the child is sick. Good knowledge regarding pneumonia is needed for prevention efforts.[17] Therefore, the mother—as a parent—needs knowledge about pneumonia for determining the signs and symptoms, handling their children when they return home, and checking up with health services for control-to-prevention efforts.[18] The purpose of health education is to provide knowledge; it will make mothers contemplate and then have a better perspective, which in turn is expected to change health behavior.[19] In this study, there was a significant difference in the pneumonia rehospitalization rates between the leaflet and the audiovisual groups ($P$ = 0.047). The odds ratio was 5.870, which means that toddlers whose mothers are given education using leaflets are 5.870 times more likely to experience rehospitalization compared to toddlers whose mothers are given audiovisual education. This is because the audiovisual type of media is easier to remember.

The educational media types also affect the ability to memorize. This memory ability will affect the results; if 10% is remembered, then someone will be able to describe the material if 20% content is remembered, one will be able to explain the material; 30% remembrance will enable the parent to demonstrate the content, while 50% remembrance will enable the participant to apply and implement the material that has been given.[20] This means that the leaflet group—with reading only (10% memory)—can only describe the material about pneumonia, while the audiovisual group combines the process of seeing and listening in 5 min 43 s of educational

video (50% memory) and will be able to practice treatment of pneumonia for their children at home. This is because the audiovisual group has knowledge media that involves more senses. The ability of mothers to care for their children and their actions to care for their children will be better in the audiovisual group; therefore, the risk of rehospitalization will be lower than in the leaflet group.

The higher the mother's knowledge of her child's disease, the higher is the mother's ability to take care of her child; in other words, the knowledge significantly improves the ability of mothers to care for their children, with a value of $P = 0.029$.[21] The results of this study are also relevant to the quasi-experimental study on 40 respondents, with each group having 20 respondents.[22] The results showed that the intervention group that was given audiovisual education had better attitudes and actions or abilities to care for children with dengue hemorrhagic fever (DHF) than the control group ($P < 0.05$). The difference between the two groups in terms of (i) child care attitudes had a value of $P = 0.007$ and (ii) the ability to care for children had the value of $P = 0.000$ .[22]

# 5. Conclusions

Providing health education for 3 d (using audiovisual or leaflet) to mothers who care for their children in hospital is effective in improving the mother's knowledge. Improvement in the post–health-education knowledge significantly reduced the rehospitalization cases in children with pneumonia. Health education using audiovisual media is more effective than using leaflet media in the effort to reduce the rehospitalization cases of children <5 years of age with pneumonia.

## 5.1 Limitations

This study has made a new breakthrough in the 3 research hospitals where digitalization demands have been pursued through health education media in the form of friendly and easy-to-understand videos for mothers and children, where previously health education only used leaflets. The video used in this study is still in the national language, which is a limitation of this study. In future research, hospitals should develop health education videos in regional languages based on the language of the majority in the area.

# Ethics approval

This study has received approval from the Penanaman Modal and Pelayanan Terpadu Satu Pintu (PM & PTSP) Service of DKI Jakarta (No. 095/AF.1/31/-1.862.9/2019) and the DKI Jakarta Health Office (No. 4.237/-1.779.3). This study has also passed the ethics review of the Faculty of Nursing UI with number 23/UN2.F12.D/HKP.02.04/2019 and has been approved by the ethics committee in the 3 hospitals.

# Conflicts of interest

No authors have any potential conflict of interest to disclose.

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