LITERATURE REVIEW: TELENURSING AND THE ADHERENCE OF HEMODIALYSIS PATIENTS

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ABSTRACT

Background: A health problem in hemodialysis patients is non-compliance with fluid restrictions. The country with the highest incidence of end-stage renal disease in 2018 was the Jalisco region in Mexico, with 594 people per million. One of the efforts to improve patient compliance is through education and monitoring. Telenursing is one of the modern information and communication technology systems in the health sector that can be used for patient monitoring and providing nursing services. **Purpose:** To determine telenursing's effect on dialysis patients' adherence. **Methods:** The research articles were obtained from three databases, ProQuest, PubMed, and Google Scholar, with 27 articles. Search literature using keywords (Bahasa and English), telenursing OR text messaging OR telephone Follow-up OR short message system OR mobile phone text messaging AND adherence OR Compliance AND hemodialysis OR dialysis with the inclusion criteria of research articles from 2016-2020, primary articles, full text, and research subjects were hemodialysis patients (either primary or secondary). The seven articles obtained were critically assessed and analyzed using Duffy's Research Appraisal Checklist Approach. **Results:** Telenursing research showed increased adherence in the presence of hemodialysis**,** fluid restriction, medicine, dietary, physical activity, and intention to quit smoking also increased knowledge, quality of life, and self-efficacy of a dialysis patient. **Conclusion:** Telenursing increases adherence to care and treatment of dialysis patients and improves health status in chronic diseases.

 Keywords: telenursing, adherence, and hemodialysis.

INTRODUCTION

End-Stage renal failure is currently one of the most common diseases. The number of sufferers of this disease is very large and continues to increase yearly. The incidence of end-stage renal disease (ESRD) with dialysis or kidney transplantation has increased by approximately 93% from 1990 to 2016, and the proportion of the population who initiate ESRD treatment with kidney transplantation has remained at around 2% over the entire period. The incidence of ESRD increased by about 102% from 1990 to 2018 (CDC, 2017). The country or region with the highest incidence of treated End-Stage Renal Disease (ESRD) in 2018 was Jalisco, Mexico, with a population of 594 per million. Thailand had a high incidence in Asia, with a population of 365 per million (United States Renal Data System, 2020). The Indonesia Renal Registry in 2018 stated that the number of new patients had doubled compared to 2017. The number of active patients undergoing hemodialysis was 77.892, with 30.831 new patients in 2017, while the number of active patients undergoing hemodialysis was 132.142 people in 2018, with the number of new patients and 66.433 people and 14.796 were new patients in West Java Province who underwent hemodialysis (Indonesian Renal Registry, 2018).

The treatment option for End-stage renal failure patients is hemodialysis (HD). Hemodialysis removes metabolic waste products or certain toxins, such as excess urea, creatinine, uric acid, and other substances, from the human blood circulation through a semi-permeable membrane. Various problems arise in patients undergoing hemodialysis. A common problem experienced by hemodialysis patients is related to the patient's non-compliance with fluid restrictions, which can trigger excess fluid in the body (Priska & Herlina, 2019).

Excess fluid volume can cause edema around the body. This condition can increase blood pressure, aggravate the work of the heart, and can also cause shortness of breath (Siamben et al., 2020). Another thing that occurs in patients with chronic kidney failure who do not limit fluids is an increase in body weight that exceeds the normal weight of 0.5 kg/24 hours (Sharaf, 2016). The factors that can cause non-compliance in implementing diet control include age, sex, occupation, lack of knowledge about regulating dietary intake, patient education, duration of hemodialysis, and family support. In this study, education by telenursing technology is a preventive and promotive service that can be used as an effort to prevent disease complications and improve quality in the hemodialysis room in achieving one of its specific goals, namely achieving dry body weight of patients without complaints obtained from the patient's intradialytic weight gain (IDWG) value.

Non-adherence to fluid restriction was 62.4%, and intradialytic weight gain (IDWG) was more than 5% (Wulan & Emaliyawati, 2018). Of dialysis patients, 20% had severe deviations, 69% had moderate deviations from dietary restrictions, 69% had severe deviations, and 22% had moderate deviations in fluid restriction (Beerendrakumar et al., 2018). Among all patients, 55% showed low adherence to treatment, and 23% showed moderate adherence. Only 22% showed high adherence to treatment, and 78% of patients were non-adherent to drug therapy (Ahlawat & Tiwari, 2016).

The high rate of non-compliance with fluid intake restrictions of hemodialysis patients causes the risk of complications and mortality due to excess fluid (Siamben et al., 2020). Failure to comply with fluid restriction can lead to chronic fluid overload and increase the risk of cardiovascular disease and hypertension.

Food and fluid management can influence inter-dialysis weight gain (IDWG). IDWG is a measure of patient compliance in undergoing hemodialysis treatment. IDWG values of more than 5.7% can increase the risk of death, while IDWG of more than 4% can increase the risk of hospitalization (Wong et al., 2017). Hence, patients need effective education and communication to maintain IDWG within normal limits. Its application can be made through structured education, which is carried out in a planned and systematic manner and is supported by certain methods required by the patient.

One of the efforts to improve patient compliance is through continuous education and monitoring. Education can increase confidence in controlling fluid intake restrictions. Interventions that can be used in implementing continuous education and

function as compliance monitoring can use communication media as telenursing.

Telenursing is a modern information and communication technology system in the health sector that can be used to provide remote nursing services or care (Shahrokhi et al., 2018). Telenursing means communication between patients and nurses indirectly but using media available to patients and their families (Ramelet et al., 2017). Telenursing allows a nurse to perform implementations such as monitoring the patient's condition, educating patients, collecting data, planning nursing actions, managing pain, and protecting the patient's family (Javanmardifard et al., 2017). Telenursing can also be used among health workers for shift reminder information, sharing information about medical updates, discussions between nurses, health workers and patients for disease management and research, and among patients themselves to share experiences and provide information support each other in the patient group (Farooqi et al., 2017).

Telenursing can be implemented in that education is not only given face-to-face using leaflets but also by providing education via telephone, WhatsApp, or text messages. Mobile health via WhatsApp education can increase the knowledge and compliance of hemodialysis patients (Akmalia et al., 2018).

Telenursing with WhatsApp via text message to patients with increased IDWG, patients will receive specific information regarding a liquid diet, low salt diet and how to reduce thirst. In addition, by telenursing via video, patients will receive more accurate and clear information so that patients can follow and practice the information correctly and accordingly.

The advantages of telenursing in this study are that patients can carry out independent treatment in controlling fluid intake according to recommended fluid restrictions, having a low-salt diet according to recommended rules, and reducing thirst by adjusting the timing of fluid intake so that they can control IDWG values, besides that controlling IDWG values supports on improving the quality of service in the Hemodialysis room.

Hemodialysis patients need education and effective communication. Thus, nurses need to improve the provision of continuous education and function as monitoring patient compliance. One of the nurse's functions is as an educator who provides knowledge, information, and skills training to patients, families, and community members to prevent disease and improve health. Hence, a literature review to determine telenursing's effect on dialysis patients' adherence.

METHOD

A literature review using three databases to search for literature sources: Google Scholar, ProQuest, and PubMed. The author used the inclusion criteria of research articles from 2016-2020. Primary articles, full text, and research subjects were hemodialysis patients (both primary and secondary). Based on the article search, 27 articles based on keywords and seven articles will be analyzed using a narrative descriptive approach in this article. The search results were depicted in the PRISMA flow chart:

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┌──────────────────────┐  ┌──────────────────────┐  ┌──────────────────────┐
│ Google Scholar       │  │ PubMed Database      │  │ Proquest Database    │
│ database (4)         │  │ (14)                 │  │ (9)                  │
└──────────────────────┘  └──────────────────────┘  └──────────────────────┘
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Identification

Article identification (n=27) → Exclusion: Articles were excluded (N=7) because they were not in accordance with the research objectives

Article identification (n=20)

Screening

→ Exclusion: Multiple articles (n=1)

Filter articles (n=19)

Eligibility

→ Exclusion:
Not relevant (n=3)
1. 1 article removed because it was not in English and Bahasa
2. 1 article removed due to a systematic review.
3. 1 article was not a full paper.

Decent full-text article (n=16)

Include

→ Exclusion: Did not answer the research question (n=9)
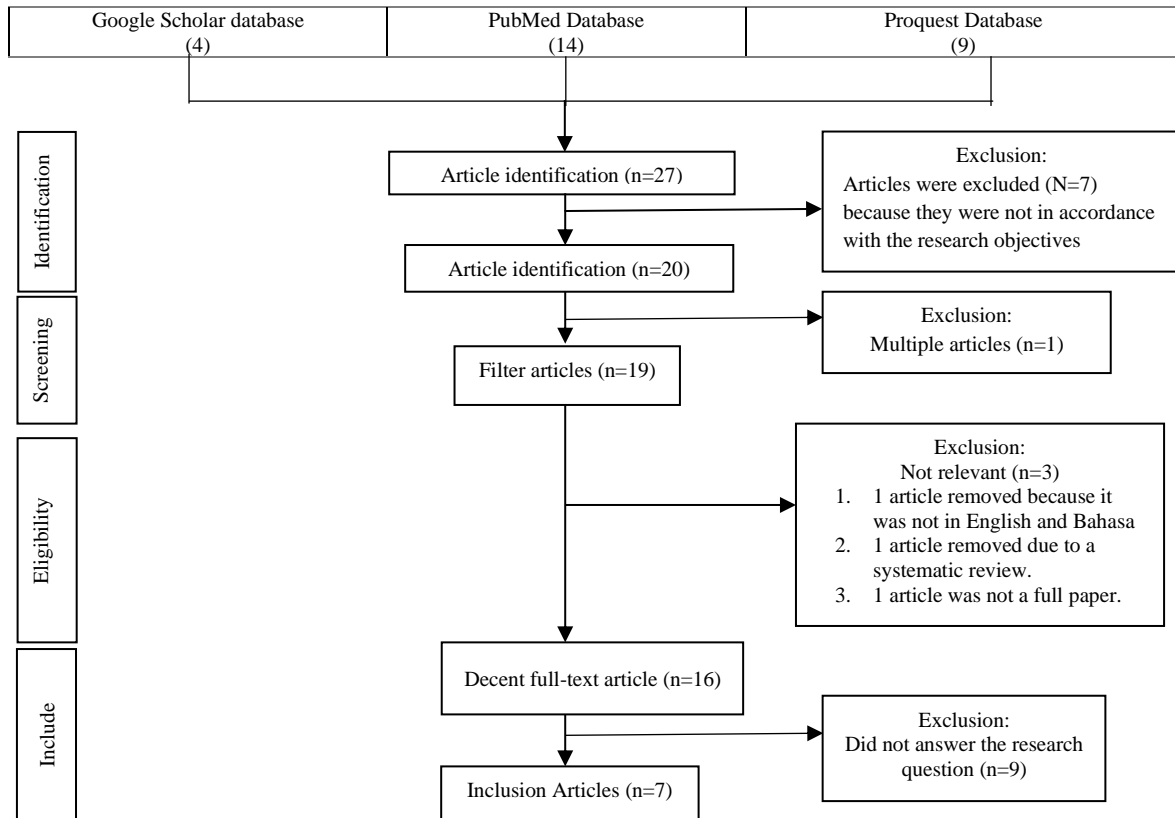
Inclusion Articles (n=7)

Chart 1. Prism Flow Diagram

The initial search for the article began by entering keywords into three databases. After that, the authors searched with the keywords telenursing OR text messaging OR telephone Follow-up OR short message system OR mobile phone text messaging AND adherence AND hemodialysis OR dialysis. The researcher analyzed the data using Duffy's research appraisal checklist approach and not has been biased assessed, and 7 articles were further analyzed as follows:

Table 1. Analyzed articles.

Author, Journal Name, Year	Title	Method (Design, Sample, Variable, Instrument, Analysis)	Research Result	Data Base
(Hosseini & Ziaeirad) International Journal of Medical Research & Health Sciences 2016	The impact of telenursing consultation by using the social networks to promote the self-efficacy and weight control in patients treating with hemodialysis	Design: RCT Sample: 52 samples Independent Variables: Telenursing nursing consultation Dependent Variables: self-efficacy and weight control of hemodialysis patients Instruments: Software Telegram, Weight control checklist, Demographic and clinical questionnaire and Shereretal self-efficacy questionnaire Analysis: Descriptive (frequency, mean and standard deviation) and Analysis of variance with repeated measurements	The average self-efficacy score increased immediately after and one month after the intervention, and the weight gain of patients in the experimental group was on average, overweight for patients. immediately after the intervention was significantly lower than their mean score before the intervention.	Google Scholar
(Akhu-zaheya & Shiyab) International Journal of Medical Informatics, 2017	The effect of short message system (SMS) reminder on adherence to a healthy diet, medication, and cessation of smoking among adult patients with cardiovascular diseases	Design: RCT Sample: 160, non-probability sample Independent Variable: SMS text message Dependent Variable: adherence to a healthy diet, medication, smoking cessation Instruments: Morisky 8-Item Medication Adherence Scale (MMAS), Mediterranean Diet Adherence Screening (MEDAS), and Readiness to Quit Ladder Analysis: Descriptive (frequency, range, mean, and standard deviation), Inferential statistics using ANOVA and T-test	There was a significant effect between the intervention groups on medication adherence, healthy diet, but no significant difference between the groups in terms of the desire to quit smoking and or the number of cigarettes smoked	Google Scholar

Continuation of Table 1. Analyzed articles

Author, Journal Name, Year	Title	Method (Design, Sample, Variable, Instrument, Analysis)	Research Result	Data Base
(Asl et al.,) Journal of Caring Sciences, 2018	Effectiveness of Text Messaging and Face to Face Training on Improving Knowledge and Quality of Life of Patients Undergoing Hemodialysis: Randomized Clinical Trial	Design: semi-experimental study Sample: 60 patients, random Independent Variables: text messages, face-to-face training Dependent Variable: knowledge, quality of life Instrument: Heks survey form, KDQOL-SF Analysis: Categorical variables are presented as frequency, mean and standard deviation. Chi-square test and ANOVA, paired T-test.	Knowledge in the group that received text messages and the face-to-face group was more significant than the control group after the intervention. There was no significant difference in quality-of-life scores in all groups. Quality of life improved in face-to-face intragroup	Google Scholar
(Santo et al.,) International Journal of Behavioral Nutrition and Physical Activity 2018	The effects of a lifestyle-focused text messaging intervention on adherence to dietary guidelines recommendations in patients with coronary heart disease: an analysis of the TEXT ME study	Design: RCT Sample: 710 Single-blind parallel group Independent Variable: text message Dependent Variable: Dietary compliance Instruments: Food data using 10 items STEPS questionnaire, diet questionnaire TEXT ME Analysis: descriptive (Means and standard deviations). ANCOVA, while categorical variables were analyzed in relation to RR using log-binomial regression.	Patient adherence to the 4 dietary guidelines recommendations at the beginning of the study was 54%, 53% in the intervention group and 56% in the control group. after six months, the intervention group had a significantly higher proportion of adherence to the 4 dietary guidelines recommendations compared to the control group	PubMed
(Rajabfreydani et al.,) Interdisciplinary Journal of Acute Care. 2020	The Effect of Telenursing on Adherence to Diet in Patients Underling Hemodialysis	Design: Quasi Experiment Sample: 44 patients Independent Variable: Telenursing Dependent Variable: Dietary compliance Instruments: Demographic data questionnaire. A 23-item questionnaire measuring adherence to dietary habits emphasizing various food categories such as carbohydrates, fats, proteins, fluids, and salt with a three-point Likert scale. Analysis: Descriptive (mean, standard deviation) and analytical tests such as paired t-test and independent t-test	Adherence to low-fat diet before the study 81.8% after the study 95.5% in the intervention group. Dietary protein adherence before the study 68.2% after the study 100% in the intervention group. Dietary adherence to fluid and electrolyte control before the study 63.6% after the study 95.5% in the intervention group	Google Scholar
(Owolabi et al.,) Medicine 2020	Impact of mobile phone text messaging intervention on adherence among patients with diabetes in a rural setting A randomized controlled trial	Design: RCT Sample: 216 Independent Variable: Message text Dependent Variable: diabetic patient compliance Instruments: The questionnaire was validated through face-to-face interviews, adherence to diet and activity was assessed by questionnaire. Text messages sent via online mass messaging platforms. Analysis: Descriptive (mean, standard deviation, minimum, and maximum). Chi-squared and Fisher's. analysis & Linear regression	The mean treatment adherence for the intervention group was 6.90 while the control group was 6.87. The average level of treatment adherence was 0.02. But there was a low level of adherence to dietary and physical activity recommendations at baseline, and both groups showed non-significant improvements in diet and physical activity adherence from baseline to the follow-up period.	PubMed
(Arad et al., 2021) BMC Nephrology (2021)	Do the patient education program and nurse-led telephone follow-up improve. treatment adherence in hemodialysis patients? A randomized controlled trial	Design: RCT Sample: 66 people Independent Variables: education and telephone follow-up Dependent Variable: hemodialysis patient compliance Instruments: Demographic questionnaire, End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ), and laboratory results record sheets. Analysis: descriptive (frequency and percentage). inferential statistics use the chi-square (χ2) test and Fisher's exact. Independent sample t-test, Paired sample t-test, ANOVA & (ANCOVA) was used to adjust for confounding variables.	There were significant differences in the mean scores for the presence of HD, medication use, fluid restriction, and dietary recommendations between the two groups immediately, 1 month, and 3 months after the intervention. The results showed a significant difference in the mean scores of the four dimensions over the four measurement points in the intervention group. Treatment adherence in the group intervention was significant compared to the control group. the mean score of laboratory values was no significant difference between the two groups after intervention, except for the serum sodium level (P = 0.130)	Google Scholar

RESULT

The implementation of telenursing in hemodialysis patients is carried out to improve the compliance of hemodialysis patients. Telenursing can be provided by various methods and other media uses. Telenursing in hemodialysis patients with nursing consultations using social networks is considered effective in increasing self-efficacy and significantly reducing weight in experimental group patients immediately after

the intervention (Hosseini & Ziaeirad, 2016). Telenursing by giving general messages and reminder messages in cardiovascular disease patients is also considered effective. There was a significant effect between the intervention groups on medication adherence and a healthy diet, but there was no significant difference between the groups in terms of the desire to quit smoking and or the number of cigarettes smoked (Akhu-zaheya & Shiyab, 2017). As well as hemodialysis patients who received Short Message System (SMS) and face-to-face training proved effective in increasing their knowledge compared to the control group (Asl et al., 2018).

Telenursing can also be provided in the form of text messages regarding dietary guidelines recommendations in coronary heart disease patients with higher adherence outcomes in the experimental group than in the control group (Santo et al., 2018). Telenursing by SMS in diabetes mellitus (DM) patients with standard diabetes care also showed an increase in medication adherence, but there was a low level of adherence to dietary recommendations from baseline to the follow-up period (Owolabi et al., 2020). In addition, telenursing in hemodialysis patients with telephone interventions for follow-up of their diet compliance with the content of the conversations assessing dietary compliance showed an increase in adherence to a low fat diet, low protein diet, fluid and electrolyte control diet in the intervention group and control group (Rajabfreydani et al., 2020).

Telenursing on hemodialysis patients in the intervention group received an education program about diet, drug use, and fluid restriction using patient education books, researchers contacted participants twice a week using the telephone for approximately 20 minutes and text messages were sent according to the topic of patient education about diet, use medication, and fluid restriction. the results showed there were significant differences in the mean scores for the presence of hemodialysis, drug use, fluid restriction, and dietary recommendations between the two groups immediately, 1 month, and 3 months after intervention (Arad et al., 2021).

The main results in this review are telenursing can increase self-efficacy, affect interdialytic weight gain, increase knowledge,

improve medication adherence, improve adherence to dietary recommendations; healthy diet, dietary guidelines, low fat diet, low protein diet, fluid, and electrolyte diet, improve fluid restriction compliance, and increase the presence of hemodialysis.

DISCUSSION

Hemodialysis patients may experience problems in daily activities, especially in adherence to diet and fluids. Successful treatment with hemodialysis requires adherence to diet, restriction of fluid intake, regular use of medications, and regular monitoring of dialysis.

The average self-efficacy score increased immediately after and one month after the intervention showed that nursing consultation using social networks was effective in increasing self-efficacy (Hosseini & Ziaeirad, 2016). Self-efficacy is a person's assessment of his ability to perform an expected action and becomes an important mediator in individual behavior to carry out appropriate health behavior (Wu et al., 2016). Hemodialysis patients who have high self-efficacy will encourage individuals to increase their compliance in limiting nutrition and fluids as recommended. There is a significant relationship between self-efficacy and compliance with fluid intake restrictions in hemodialysis patients, meaning that the better the patient's self-efficacy, the higher the patient's compliance in limiting fluid intake (Barik et al., 2020). Self-efficacy training had an effect on compliance with fluid restriction 17.7%, 82.3% was influenced by other variables outside the study (Siamben et al., 2020).

The effectiveness of the use of short message system (SMS) reminders in improving adherence to recommended medication regimens, healthy diet, and smoking cessation among adult patients with cardiovascular disease. In this study SMS about adherence to a healthy diet, especially the Mediterranean Diet community. SMS can also serve as an effective reminder technique for patient behavior modification and is useful for following up individuals after smoking cessation (Akhu-zaheya & Shiyab, 2017). The study provides evidence that SMS as a reminder will encourage patients to adhere to the recommended regimen for patients with cardiovascular disease. A study by (Estaji et al., 2016) demonstrated the

effectiveness of training in patients through text messages on dietary compliance, medication regimen compliance and hemodialysis session compliance.

Follow-up intervention by telephone was carried out for 3 months in the intervention group, most of the participants sometimes only followed a low-fat diet, which is an indication of undesirable adherence to this diet. Then about adherence to a diet containing protein, prior to the study in the two case and control groups, most of the subjects occasionally adhered to this diet only, as well as adherence to a controlled water and electrolyte diet (Rajabfreydani et al., 2020). Telephone counseling and follow-up improves medication adherence and hemodialysis adequacy, and is recommended in hemodialysis patients (Ezzt et al., 2018). According to (Arad et al., 2021) Telenursing is a new way of doing nursing care, and is widely used as an effective approach in treating patients with chronic diseases. The results of this study indicate that patient education programs and nurse-led telephone follow-up can improve medication adherence on four dimensions of hemodialysis (HD) presence, drug use, fluid restriction, and dietary recommendations in HD patients. There is a positive effect of telephone follow-up by nurses as a telenursing method on improving adherence to diet and regimen medication in patients with myocardial infarction (Najafi et al., 2016).

Face-to-face education and text messages had a significant impact on increasing knowledge of kidney failure patients treated with hemodialysis (Asl et al., 2018). Text messages can increase the knowledge of diabetes patients and the use of mobile phone technology for diabetes-related health education through text messages is an effective method for health promotion (Basu et al., 2021). Text message in the intervention group showed increased adherence to dietary guideline recommendations in the subgroups with low and high education, low and high body mass index (BMI), smokers and nonsmokers with no identified heterogeneity. There was increased adherence to dietary guideline recommendations with the main findings of the TEXT ME (Santo et al., 2018). The provision of counseling and SMS gateway is very effective in improving diet compliance, control, pill count, post prandial blood sugar control (GDPP), HbA1c (Sucipto & Fadillah, 2017).

Study telenursing with education via telephone and text message by (Owolabi et al., 2020) explained that adherence to diet and physical activity was very low in the intervention study group or the control group. There was a moderate level of adherence to medication use among participants. There is a significant difference in the proportion of medication adherence in Tuberculosis (TB) patients who are sent SMS and not sent SMS or SMS reminder short messages increase adherence to taking medication for TB patients (Dwi, 2017). (Mobile text message intervention targeting dietary behavior in people undergoing hemodialysis is feasible and has the potential to alter dietary behavior and improve clinical parameters, such as fluid and drug management (Dawson et al., 2020).

CONCLUSION

Based on a review of several articles and other literature, it was stated that telenursing improves adherence to care and treatment of dialysis patients and improves health status in chronic diseases. In ESRD patients undergoing hemodialysis it can be used to improve dietary compliance, medication adherence, fluid compliance, and hemodialysis session compliance, as well as improve patient care and treatment services.

SUGGESTIONS

Telenursing can be used as an educational method in hospitals to improve adherence of hemodialysis patients.

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CONFLICT OF INTEREST

The author has no conflict of interest.

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