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Meta-Analysis
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Meta Analysis: Patient's Satisfaction with the Outpatient's Telemedicine Service

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ABSTRACT

Background: Telemedicine is a combination of information and communication technology with medical science to provide health services that are not limited to space and can be done remotely (PB IDI, 2020). Patient satisfaction is referred to as the most integral element in the successful implementation of telemedicine (Ploog et al, 2022). This study aims to compare the satisfaction level of outpatients between telemedicine visits and regular face-to-face visits using meta-analysis.
Subjects and Method: This study used a systematic review and meta-analysis based on pico as follows, population: outpatient polyclinic, intervention: telemedicine services, comparison: standard care, outcome: patient satisfaction. Data were obtained from the PubMed, Google Scholar, Springer-link, National Center for Biotechnology Information, MEDLINE, Cochrane Library, and Science Direct databases published from 2020 – 2022. The keywords used in the article search were "telemedicine", "telehealth", " virtual care", "online follow up care", "telemedicine vs in office" "telemedicine vs conventional", "patient satisfaction", "patient experience", and "randomized clinical trial." The inclusion criteria were in the form of a full paper article using a randomized clinical trial design, the subjects were outpatients, new patients and follow-up patients, had a control group that assessed standard services, the study outcomes used the mean SD. Article selection used the PRISMA flowchart and the results were analyzed using Review Manager 5.3 software.
Results: A meta-analysis of 10 articles from Hong Kong, Turkey, Germany, Austria, the Netherlands, Ireland and the United States with a sample size of 1412 outpatient polyclinics showed that outpatient polypatients who received telemedicine services had an average satisfaction level of 0.38 points. higher than standard service (SMD= 0.38; 95% CI= -0.01 to 0.77; p= 0.060). The meta-analysis of this study showed significant heterogeneity of effect estimates between studies (I^2 = 69%; p<0.001), so the analysis used was the Random Effect Model (REM).
Conclusion: Patients who received telemedicine services experienced an average satisfaction level of 0.38 higher than patients who received standard services (SMD= 0.38; 95% CI= -0.01 to 0.77; p= 0.060).

Keywords: Telemedicine, Patient satisfaction, Meta-analysis

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BACKGROUND

Telemedicine is a combination of information and communication technology with medical science to provide health services that are not limited to space and can be done remotely (PB IDI, 2020). Telemedicine usually takes the form of interaction via video, telephone, or interactive services on web pages. The application of telemedicine strategies in various fields of medicine is carried out to diagnose, provide treatment, disease prevention media, research, and educational activities. (Cascella et al, 2022).

Telemedicine is growing rapidly along with the increasing development of the internet and adequate electronic information facilities and sophisticated telecommunications technology (Atmojo et al, 2020). In 2019 the coronavirus disease 2019 (COVID-19) pandemic resulted in the closure of medical clinics worldwide followed by ongoing physical distancing efforts. so that during this period the need for telemedicine increased, patient enthusiasm for telemedicine also increased, indicating the potential for telemedicine practice to continue in the long term, even though the pandemic period has ended. (Vaccaro et al, 2020).

Several studies have found that the clinical outcomes of patients attending telemedicine visits are comparable to those attending regular in-person clinic visits. (Abdel et al, 2021). Sholihah et al conducted a meta-analysis with research results proving that the use of telemonitoring in type II diabetes patients was associated with a 0.20 times decrease in blood sugar level (HbA1c) and an increase in quality of life of 0.16 times compared to not using telemonitoring. (Sholihah et al, 2021). Kartikasari et al said using telehealth could increase ANC visits by 1.32 times compared to not using telehealth (Kartikasari et al, 2022).

Patient satisfaction is an integral part of quality assurance of health services. (Munawarah et al., 2021). If the health service can satisfy users according to the average satisfaction level, then it is categorized as good or high quality service. (Safitri et al., 2021). Therefore satisfied patients are a very valuable asset (Kumalasari et al., 2021). Patient satisfaction is said to be the most integral element in the successful implementation of telemedicine, where if it is not achieved, the adoption of telemedicine technology and services will fail and become redundant and expensive. The use of telemedicine visits as an alternative to regular in-person visits will continue and thrive only if we achieve patient satisfaction between these two modalities. (Ploog et al, 2022).

Research on patient satisfaction with telemedicine has had mixed results. Research at a New York health care center shows that patient satisfaction levels with telemedicine (remote video) are higher than regular face-to-face visits. (Ramaswamy et al, 2020). In line with this, research by Umiati et al also shows telemedicine services can increase patient satisfaction with the Standardized Mean Different (SMD) by 0.41 compared to non-telemedicine (Umiati et al 2022). However, research on orthopedic patients in America showed no difference in the level of patient satisfaction with telemedicine services and regular face-to-face services (Bisson et al, 2021). Most previous studies of patient satisfaction with telemedicine were conducted by individual organizations that fit into only one practice category so there is a gap in the literature involving patients across large geographic areas with multiple practice categories. (Ploog et al, 2022).

For these reasons, the authors are interested in conducting this meta-analysis. This study aims to compare the satisfaction level of outpatients between telemedicine

visits and regular face-to-face visits by analyzing existing randomized control trials.

SUBJECTS AND METHOD

1. Study Design

This study uses a systematic review method and meta-analysis using secondary data from published previous research articles. Article searches were obtained through a systematic and comprehensive database from Webiste PubMed, Google Scholar, Springerlink, National Center for Biotechnology Information, MEDLINE, Cochrane Library, and Science Direct published from 2020 – 2022. The keywords used in the article search were (telemedicine OR telehealth OR "virtual care" OR "online follow up care") AND ("patient satisfaction" OR "patient experience") AND "randomized clinical trial." There were 10 articles that met the inclusion criterias.

2. Steps of Meta-Analysis

Meta-analysis analysis was carried out through 5 steps as follows:

1) Formulate research questions in PICO (Population, Intervention, Comparison, Outcome). The study population was outpatient poly patients. The research intervention is a telemedicine service. Comparison research is a standard service. The research outcome is patient satisfaction.
2) Search for primary study research articles from online databases namely PubMed, Google Scholar, Springerlink, National Center for Biotechnology Information, MEDLINE, Cochrane Library, and Science Direct published from 2020 – 2022.
3) Conduct screening and quality assessment of primary research articles
4) Combine results and analyze data into the RevMan 5.3 application
5) Conduct findings in context, analyze results and draw conclusions

3. Inclusion Criteria

Full paper article using a randomized clinical trial design. Subjects are outpatients, new patients and follow-up patients. Have a control group that assesses standard services. The research outcome uses the mean SD.

4. Exclusion Criteria

Articles published before 2019, do not use English, and non RCT.

5. Operational Definition

Telemedicine, outpatient health services including information on diagnosis, treatment, disease prevention, remote monitoring and follow-up by health professionals using electronic information technology facilities. The instrument uses observation & checklist and the measurement scale is nominal.

Standard Services, outpatient health services include information on diagnosis, treatment, disease prevention, standard monitoring and follow-up by health professionals. The instrument uses observation & checklist and the measurement scale is nominal.

Patient Satisfaction, the patient's personal judgment regarding the pleasure or happiness experienced by the patient while using health services. The instrument uses a questionnaire and a measurement scale that is numeric.

6. Istrument

Assessment of research quality uses the CASP Randomized Controlled Trial Standard Checklist (Critical Appraisal Skills Programme, 2020).

7. Data Analysis

The articles in this study were collected using the PRISMA diagram and analyzed using the Review Manager 5.4 application (RevMan 5.4) by calculating the fixed effect model and heterogeneity (I^2) to determine the combined research model and form the final results of the meta-analysis. The results of data analysis are presented in the form of forest plots and funnel plots.

RESULTS

The process of searching for articles related to outpatient polypatient satisfaction with telemedicine services in this meta-analysis study which was conducted on several online databases yielded 10 articles which can be seen in Figure 1 PRISMA Flow Diagram. The total number of articles from various database searches in the initial search process was 2,716 articles. Then, 2,029 duplicate articles were deleted, 209 articles were filtered, then full text articles that were considered eligible were 82, then after removing articles that were not suitable, the remaining 10 articles were included in the synthesis meta-analysis.

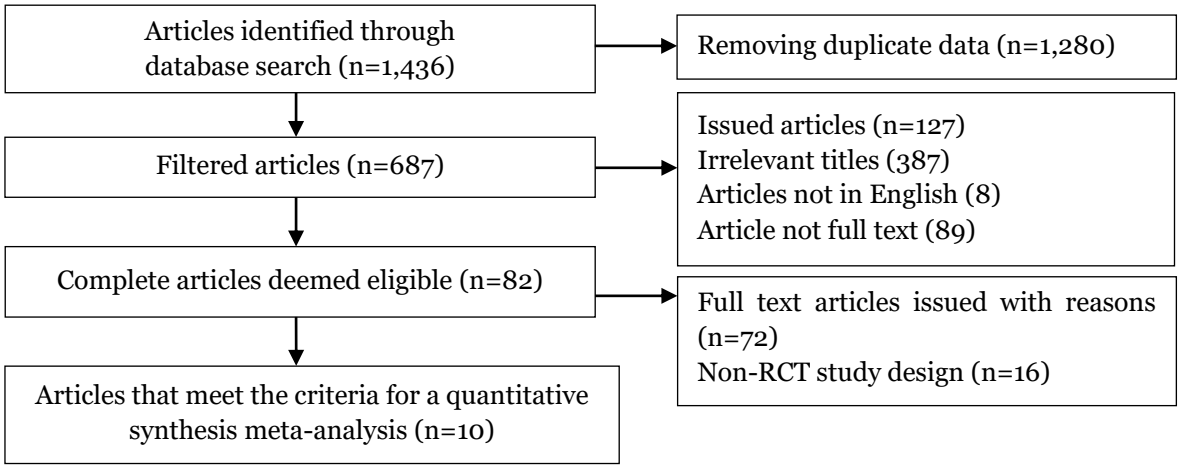

Figure 1. PRISMA Flow diagram

Figure 2. Map of the distribution of Outpatient Poly Patient Satisfaction Research on Telemedicine Services

Table 1 shows the results of the primary research quality assessment used for this study. Assessment of research quality uses the CASP Randomized Controlled Trial Standard Checklist (Critical Appraisal Skills Programme, 2020).

Based on the results obtained from the study quality assessment, the mean total score in the 10 selected primary studies was 24. This indicates that the quality of all the primary articles used in this study is eligible for meta-analysis.

Table 1. Critical appraisal checklist for cross-sectional studies in the meta-analysis (n=1,412)

Author (Year)	Criteria of Question												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Champion et al (2021)	2	2	2	2	2	2	2	2	2	2	2	2	24
Muschol et al (2022)	2	2	2	2	2	2	2	2	2	2	2	2	24
Altmann et al (2022)	2	2	2	2	2	2	2	2	2	2	2	2	24
Radtke et al (2021)	2	2	2	2	2	2	2	2	2	2	2	2	24
So et al (2022)	2	2	2	2	2	2	2	2	2	2	2	2	24
Lee et al (2021)	2	2	2	2	2	2	2	2	2	2	2	2	24
Treskes et al (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Turner et al (2022)	2	2	2	2	2	2	2	2	2	2	2	2	24
Paul et al (2020)	2	2	2	2	2	2	2	2	2	2	2	2	24
Eren et al (2022)	2	2	2	2	2	2	2	2	2	2	2	2	24

Description of the answer score:

1 = Yes

0 = No

Question criteria descriptions:

1) Was the population in the primary study the same as the population in the PICO meta-analysis?
2) Is the operational definition of exposure/ intervention in the prime study the same as the definition intended in the meta-analysis?
3) Is the comparison used in the primary study the same as that planned for the meta-analysis? In the RCT, did the comparator receive placebo or standard therapy?
4) Are the outcome variables studied in the primary study the same as those planned in the meta-analysis?
5) Was the sample selected from the population so that the sample represents the population?
6) Is the allocation of subjects into the experimental and control groups with the same instrument in all primary studies?
7) If the variables are measured on a categorical scale, are the cutoffs or categories used the same between primary studies?
8) Was double-blinding carried out, namely the research subjects and research assistants who helped measure the outcome variable did not know the intervention status of the research subjects?
9) Is there a possibility of "Loss-to-Follow-up Bias"? what have the primary studies done to prevent or address the bias?
10) Was there any confusion in the results/ conclusions of the primary study?
11) Did the primary study investigator use appropriate methods to control for the effects of ambiguity?

Table 2. PICO table of primary studies of telemedicine services included in the meta-analysis (n=1,412)

Author (Year)	Country	N	P	I	C	O
Champion et al (2021)	Pennsylvania	47	Postoperative follow-up patient for 3rd molars during the COVID pandemic	Telemedicine	Usual face-to-face clinic care	Patient satisfaction questionnaire with 5 questions (scale 1-10)
Muschol et al (2022)	Germany	52	Patient follow-up after shoulder and knee surgery during the COVID pandemic	Telemedicine	Usual face-to-face clinic care	Patient satisfaction using a questionnaire with 4 questions (scale 1-6)
Altmann et al (2022)	Austria	45	Random multiple sclerosis patients in Austria during the COVID pandemic	Telemedicine	Usual face-to-face clinic care	Patient satisfaction using a questionnaire with 8 questions (scale 17-85)
Radtke et al (2021)	Texas	41	Follow-up patient after laparoscopic hysterectomy surgery during the COVID pandemic	Telemedicine	Usual face-to-face clinic care	Patient satisfaction using a questionnaire with 7 categories of questions (scale 1-5)
So et al (2022)	Hongkong	122	Lupus nephritis patient during the COVID pandemic	Telemedicine	Usual face-to-face clinic care	Patient satisfaction using a questionnaire with 3 questions (scale 0-4)
Lee et al (2021)	Pennsylvania	52	Patient follow-up after pelvic surgery	Video conference	Usual face-to-face clinic care	Patient satisfaction using a questionnaire with 18 questions (scale 18-90)
Treskes et al (2020)	Netherland	200	Post mrs follow up patient with myocardial infarction	Telemedicine	Usual face-to-face clinic care	Patient satisfaction using a questionnaire with 7 questions (scale 0-100)
Turner et al (2022)	Ireland	60	Patient pros of knee arthroplasty	*Teleconsent*	Regular face-to-face clinic appointments	Patient satisfaction using a questionnaire (scale 0-10)
Paul et al (2020)	Georgia	762	Patient follow-up after arm surgery during the COVID pandemic	*Telemedicine*	Usual face-to-face clinic care	Patient satisfaction using a questionnaire with 5 questions (scale 1-5)
Eren et al (2022)	Turkey	31	Follow-up patients after hip replacement surgery	*Video education*	Usual face-to-face clinic care	Patient satisfaction using a questionnaire (scale > 10)

Table 2 presents descriptions of the 10 primary articles with cross-sectional studies included in the meta-analysis of outpatient polyclinic patient satisfaction with telemedicine services, with a total sample of 1,412 samples.

Table 3. SMD data on telemedicine services included in the meta-analysis (1.412)

Author (year)	Standard		Telemedicine	
	Mean	SD	Mean	SD
Treskes et al. (2020)	82.6	14.1	82	15.1
Paul et al. (2020)	4.61	0.76	4.88	0.4
Lee et al. (2021)	4.5	0.6	4.1	0.6
Champion et al. (2021)	80.7	2.6	81.2	2.8
Radtke et al. (2021)	48.78	2.3	46.46	6.51
Muschol et al. (2022)	2.2	0.6	1.9	0.8
Eren et al. (2022)	9.8	0.4	9	1
So et al. (2022)	1.58	0.64	1.64	0.56
Turner et al. (2022)	8.62	1.12	5.77	2.29
Altmann et al. (2022)	65	7.5	58	6.7

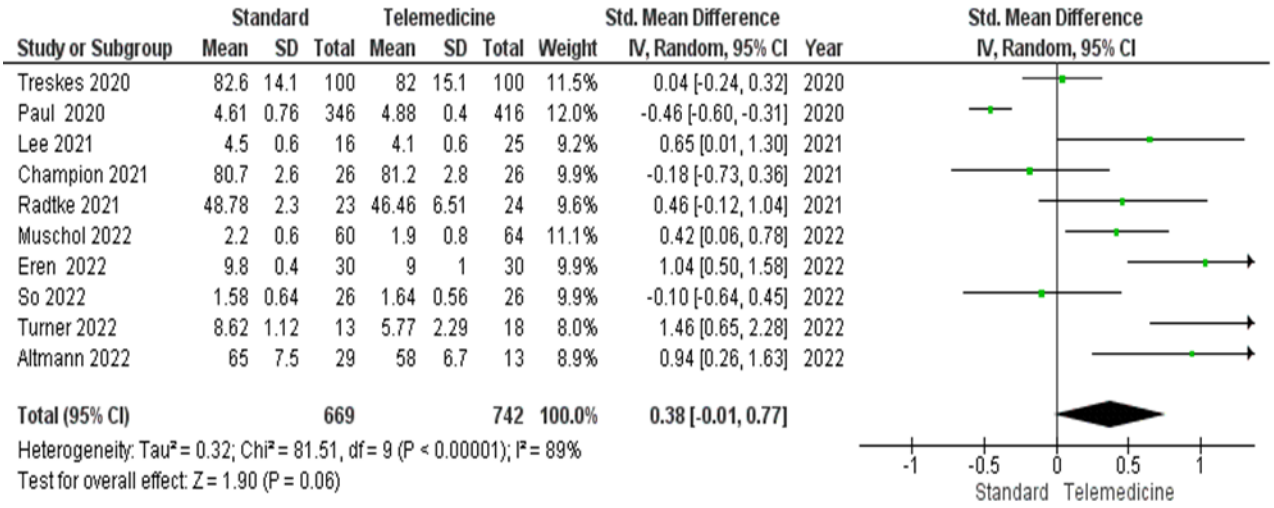

Figure 3. Forest plot of the effect of telemedicine services on the level of patient satisfaction in outpatient polyclinics

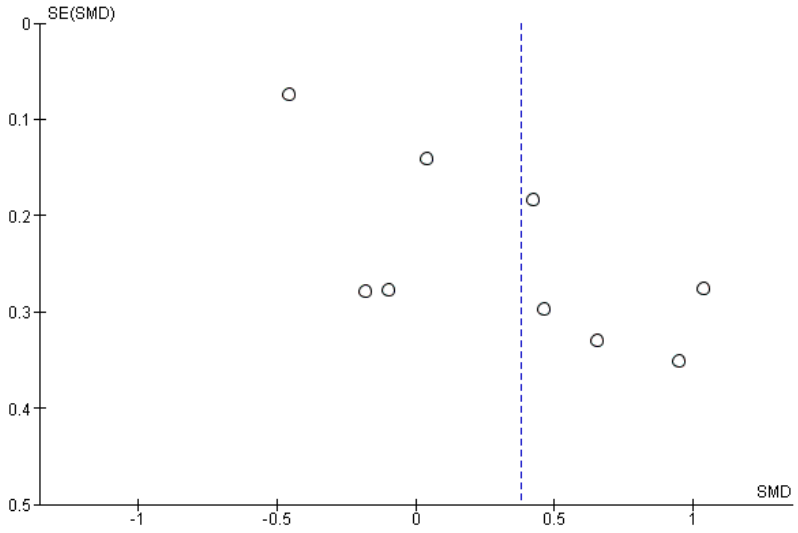

Figure 4. Funnel plot of the influence of telemedicine services on the level of patient satisfaction in outpatient polyclinics

a. Forest plot

The forest plot in Figure 4.3 shows that there are differences in patient satisfaction between telemedicine services and standard services. And the difference is close to significant (marginally significant). Outpatient polyclinic patients who received telemedicine services had an average satisfaction level of 0.38 points higher than standard services (SMD= 0.38; 95% CI= -0.01 to 0.77; p= 0.060). The forest plot also showed large heterogeneity of effect estimates between studies (I^2= 69%; p <0.001). Thus the calculation of the average effect estimate uses the random effect model approach.

b. Funnel plot

The funnel plot in Figure 4.4 shows a more or less symmetrical distribution of the effect estimates of each primary study to the right and left of the vertical mean estimate line. Each plot in the funnel plot represents one study in the research meta-analysis which describes the effect size of each study. Thus, the funnel plot does not show publication bias.

DISCUSSION

Telemedicine refers to the use of telecommunications technology to provide assessment and treat patients. This technology is usually in the form of video, telephone, zoom meetings, interactive web, and smart smartphone applications (Chaudhry et al, 2021). Telemedicine has the potential to expand the boundaries of health service practice by providing equal opportunities for access to health facilities and services for patients in remote and rural areas. With telemedicine, both health workers and patients are greatly helped by the ease of use and affordable costs, which have an impact on improving clinical communication and patient outcomes (Sinha et al, 2019).

This study takes the topic of outpatient polyclinic patient satisfaction with telemedicine services compared to face-to-face standard services. The independent variables in this study are telemedicine services, standard services, and the dependent variable is patient satisfaction. Confounding factors are factors that cannot be seen, but can be controlled. Confounding factors can affect the relationship or effect of exposure to disease events that are estimated (estimated) by studies that are not the same as the relationship or effect that actually occurs in the target population or study results that are not valid (Anggara et al, 2021). This study controlled for confounding factors which can be seen from the inclusion and exclusion criteria. There were 10 articles that passed the inclusion and exclusion criteria from several primary studies that were included in this systematic review and meta-analysis.

The forest plot of this study showed large heterogeneity of effect estimates between studies (I^2= 69%; p<0.001), so the analysis used was the Random Effect Model (REM). High heterogeneity is based on the variation or diversity between populations as seen in the different number of samples between the experimental and control groups, the level of satisfaction that has different variations, the various assessment instruments for satisfaction levels, the various telemedicine methods and the amount of time of intervention that varies . And of the 10 related articles, there are 6 articles which show the significant value of telemedicine services on the level of patient satisfaction. The significance value of the article used is marked by the results of each study that do not touch the horizontal line with the vertical line on the forest plot.

Based on the research results, most (7 out of 10) articles in this meta-analysis have research results in the form of a higher level of patient satisfaction in telemedicine ser-

vices compared to standard services. However, uniquely, after we meta-analyzed the article, we found that patients who received standard services experienced an average satisfaction level of 0.38 higher than patients who received telemedicine services (SMD= 0.38; 95% CI= -0.01 to 0.77; p= 0.060). This is in line with the results of a meta-analysis by Zhang et al which concluded that telemedicine services (in this case in the form of virtual preoperative assessments) have a high level of patient satisfaction with a combined estimate of 90%. High patient satisfaction is associated with efficient, accurate service, reduced travel time and costs, and many patients enjoy the convenience of speaking with anesthesiologists via a virtual platform, without having to take time off to attend separate preoperative clinic visits. (Zhang et al, 2021)

Melian et al conducted a meta-analysis with the aim of evaluating patient satisfaction with telemedicine services for orthopedic patients. Of the 8 articles included in the meta-analysis, it was found that patients who received telemedicine services were on average 1.5 times more likely to choose them again compared to returning to standard visits, with the average difference in patient satisfaction between telemedicine services and the control group being 0.10 (SMD= 0.10; 95% CI = 0.07–0.27; p= 0.270). Reasons for choosing teleconsultation over standard services include ease of visiting, convenience, lower costs due to reduced travel costs such as transportation, parking fees and tolls, not disturbing work time because you do not have to take time off work to attend consultations and reduced childcare costs associated with an in-person visit. (Melian et al, 2020).

Gan et al also reported that a total of 631 family samples of pediatric patients who went to the urology polyclinic showed high satisfaction with telemedicine services, in this case in the form of video services (median score 10/10). They think that video services are sufficient to meet their child's medical needs and 90% of families say they highly recommend telehealth services to other families. Families reporting high overall satisfaction spoke of experiences such as the ease of completing health services at their home and the ability to connect with several health workers at the same time. Families' willingness to recommend telehealth services to other families indicates that they perceive these services to be effective in communicating their needs and determining treatment plans. (Gan et al, 2021)

Although it has been around for a long time, telemedicine services have developed rapidly in recent years. It is known that from 2016 to 2019, the use of telemedicine in health facilities has doubled nationally from 14% to 28%. Then during the global COVID-19 pandemic in 2020, the use of telemedicine has played an important role in providing patient care in a timely manner while providing the recommended social and physical distancing to prevent the spread of infectious diseases. (Yao et al, 2022). A study in Saudi Arabia by Nasser et al which aimed to assess patient satisfaction with telemedicine during the COVID-19 pandemic showed an average patient satisfaction score of 33.24 ± 5.94 with the highest satisfaction reported by respondents 53.4% for ease of registration, 40.1% for visual image quality, 41.9% for audio sound quality, and 44.8% for ability to speak freely through remote treatment. This shows that during the COVID-19 lockdown, patient satisfaction with telemedicine consulting services was high (Abdel et al, 2021).

High patient satisfaction in the telehealth group shows that telemedicine services are a practical way to provide care to patients when face-to-face services are not available. (Eannucci et al, 2020). However,

telemedicine services are still not commonly used by health professionals due to a lack of skills by health workers with technology, a lack of high-quality internet services, and insurance issues. Therefore, skills training, relevant policies, and regulations for using technology are necessary to develop a perfect telemedicine service. Humans and technology must complement each other, and clinical practitioners must integrate the advantages of telemedicine services with standard services to provide comprehensive and optimal care for patients, as well as increase patient satisfaction which has an impact on improving quality of life. (Li et al, 2021)

A meta-analysis study on the satisfaction level of outpatient polyclinics with telemedicine services was conducted on 10 articles originating from Hong Kong, Turkey, Germany, Austria, the Netherlands, Ireland and the United States with a sample size of 1412 outpatient polypatients. The results of the meta-analysis concluded that patients who received telemedicine services experienced an average satisfaction level of 0.38 higher than patients who received standard services (SMD= 0.38; 95% CI= -0.01 to 0.77; p= 0.060). The results also showed significant heterogeneity of effect estimates between studies (I^2 = 69%; p<0.001) and the distribution of effects between studies showed no publication bias in the meta-analytic study.

This research has limitations in the form of the possibility of search bias because in this study only used several electronic journal databases so that it ignored other search sources, Language bias because in this study only used English in the articles analyzed, thus ignoring articles using other languages, as many as 10 the articles in this study are not spread across all continents in the world, but only in the Americas, Europe and Asia. As well as one study with another study did not use the same telemedicine method so that it could not be analyzed further.

AUTHOR CONTRIBUTION

Farahdilla Aribowo Putri as a researcher who selects topics, searches for and collects research data. Didik Tamtomo and Hanung Prasetya analyzed the data and reviewed research documents.

CONFLICT OF INTEREST

There was no conflict of interest in the study.

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