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TRAINING OF TRAINERS FOR KADER SURABAYA HEBAT (KSH) IN RATIONAL ANTIBIOTIC USE FOR DENTISTRY AT PUSKESMAS PEGIRIAN

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Abstract

Abstract. The irrational use of antibiotics in dentistry, including self-medication, incomplete treatment, and inappropriate prescriptions, remains a major public health concern that contributes to antimicrobial resistance. At the same time, many communities lack sufficient access to accurate information on the proper use of antibiotics in dental care. Situation analysis at Puskesmas Pegirian highlighted that Kader Surabaya Hebat (KSH) play a central role in health promotion but require greater knowledge and confidence to educate the public on rational antibiotic practices. To address this gap, a Training of Trainers program was designed and implemented with KSH as participants. The training combined health counseling sessions, interactive discussions, and practical demonstrations focused on the importance of rational antibiotic use in dentistry. To evaluate the effectiveness of the program, participants completed a pre-test before the training and a post-test after the sessions. The results showed a clear improvement in knowledge and awareness, with KSH reporting stronger confidence to deliver educational messages within their communities. This initiative demonstrates that targeted training supported by measurable evaluation can effectively strengthen the role of KSH. The conclusion emphasizes that investing in KSH capacity is a sustainable strategy to promote rational antibiotic use in dentistry at the community level.

Keywords: Training of Trainers, Kader Surabaya Hebat (KSH), Rational Antibiotic Use, Dentistry, Puskesmas Pegirian

INTRODUCTION

The rational use of antibiotics in dentistry has become an urgent global concern because of the increasing threat of antimicrobial resistance. Antibiotics are still vital for the management of odontogenic infections and as prophylaxis in selected dental procedures. However, their misuse, such as prescribing without indication, giving the wrong dosage, extending or shortening duration, and incomplete consumption, accelerates the development of resistant pathogens and reduces patient safety. In dentistry, it is estimated that around ten percent of all antibiotic prescriptions worldwide originate from dental practice. Although

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overall use of antibiotics has declined in several countries, the proportion that comes from dental care has continued to rise (Cirkel *et al.*, 2025). Irrational antibiotic use in dentistry remains a pressing challenge. Practices such as self-medication, incomplete courses, and unnecessary prescriptions are frequently reported and contribute to antimicrobial resistance, which the World Health Organization has identified as a major global health threat. The oral cavity, with its diverse microbiota and repeated antibiotic exposure, represents a particularly high-risk environment for the emergence of resistance (Farzinnia, Anvari and Siqueira, 2025). In fact, most odontogenic infections can be managed by local measures such as drainage, cleaning, or extraction, while antibiotics should only be used when severe or systemic involvement is present (Sidabutar *et al.*, 2019).

In Indonesia, comprehensive data are still limited, but irrational antibiotic use in dentistry seems to follow national patterns of inappropriate prescribing in primary care. Several barriers have been identified, including the absence of consistent local guidelines, pressure from patients who expect antibiotics, and limited awareness among dental practitioners about stewardship principles. These realities highlight the importance of strengthening education at the community level so that information about when antibiotics are truly needed can be spread more widely and accurately (Teoh *et al.*, 2025). Community health partners play a central role in bringing health knowledge closer to the public. In Surabaya, Kader Surabaya Hebat or KSH are trusted members of the community who actively support health promotion. They are well positioned to spread correct information about oral health and rational antibiotic use. Situation analysis at Puskesmas Pegirian revealed that even though KSH are respected in their communities, they often lack sufficient knowledge and confidence to provide education on antibiotic stewardship in dentistry. Their role can therefore be strengthened with proper training and structured support.

One method that has been proven effective in building community capacity is the Training of Trainers model. This approach provides selected participants with sufficient knowledge and skills so they can continue to train others in their community. The model has been widely applied in health promotion and is known to increase knowledge, shape attitudes, and improve preventive practices (Setiawan, 2021). In dentistry, this approach can be adjusted to cover the correct role of antibiotics, local infection control strategies, and ways to communicate complex issues in simple language. Recent studies also show that digital learning, structured guidelines, and targeted training can improve antibiotic awareness among both professionals and the public (Roganović *et al.*, 2024).

In this community service activity, the Training of Trainers method was applied for KSH at Puskesmas Pegirian with a focus on rational antibiotic use in dentistry. The training program will be delivered through structured sessions including lectures, group discussions, and hands-on demonstrations, aiming to build both knowledge and practical skills for Kader Surabaya Hebat (KSH). The impact of the training will be assessed using a pre-test before the intervention and a post-test afterward, enabling objective measurement of improvements in knowledge and confidence among KSH. Such evaluation is critical to validate the effectiveness of educational strategies in antibiotic stewardship. Evidence from dental settings has shown that combining educational interventions with assessments and feedback can change prescribing behavior and improve rational antibiotic use. For example, a multimodal intervention in a dental environment led to a substantial decrease in antibiotic prescriptions

after implementation of stewardship strategies (Teoh *et al.*, 2025).

IMPLEMENTATION METHOD

The implementation of this community service activity was designed to address the problem of irrational antibiotic use in dentistry at the community level. The chosen model was a Training of Trainers (ToT) program for Kader Surabaya Hebat (KSH) at Puskesmas Pegirian, who are trusted community partners with direct contact to residents. This approach combined systematic planning, participatory training methods, and measurable evaluation to ensure that both the process and outcomes could be effectively assessed. The uniqueness of the program was the integration of a flipchart module developed specifically to support cadre education on rational antibiotic use in dentistry.

Preparation Stage

The first stage consisted of planning and coordination. Coordination meetings were held with the management of Puskesmas Pegirian and local health officials to obtain approval, identify the cadre participants, and align the training with the needs of the health center. At this stage, baseline data were collected through informal interviews and short questionnaires to map the current knowledge and perceptions of KSH regarding antibiotics in dentistry. The results confirmed that most cadres were familiar with antibiotics in general, but lacked specific understanding about indications, risks, and the role of antibiotics in dental care. This finding was consistent with previous studies showing that knowledge gaps among community health workers are common, especially when the topic involves antimicrobial stewardship (Roganović *et al.*, 2024).

A key innovation in the preparation stage was the development of a learning module in the form of a flipchart. The flipchart was designed to be portable, durable, and visually attractive, with simple language and illustrations suitable for community education. The content included explanations about the function of antibiotics, conditions in dentistry that require antibiotic use, risks of overuse such as resistance, and preventive strategies such as oral hygiene and local treatment to reduce unnecessary prescriptions. Flipcharts were chosen because they are effective for low-literacy settings and allow cadres to explain complex topics using clear visual aids. The development of this flipchart involved consultation with dental academics, public health experts, and input from KSH themselves to ensure relevance and practicality.

Implementation Stage

The ToT program was carried out over two days at Puskesmas Pegirian. Each day was structured into sessions that combined theory and practice. The methods used were designed to be interactive and participatory, as evidence shows that active learning approaches improve retention of knowledge and increase self-confidence in delivering health education. The first day focused on lectures and discussions (Cirkel *et al.*, 2025). Topics included the definition of antibiotics, appropriate and inappropriate uses in dentistry, risks of irrational prescribing, and strategies for community education. These sessions were delivered using flipchart presentations, case studies, and group discussions where KSH could share their experiences and misconceptions encountered in the field.

The second day emphasized practice and demonstration. Role-play activities were conducted where KSH acted as educators delivering counseling to "community members" using the flipchart. Trainers observed the sessions and provided constructive feedback on communication skills, accuracy of information, and ability to handle questions (Roganović and Barać, 2024). The use of role play was particularly important because it allowed KSH to practice real-life scenarios, boosting their confidence to carry out the task outside the training setting. Similar participatory methods have been documented as effective in cadre training for health promotion activities.

Evaluation Stage

Evaluation was embedded into the program through pre-test and post-test assessments. Before the training began, all participants completed a pre-test questionnaire consisting of multiple-choice questions on antibiotics, dental indications, and resistance. At the end of the training, the same questionnaire was administered as a post-test. This method provided an objective measure of knowledge gain, and results showed a significant improvement in average scores. Beyond knowledge, self-reported confidence levels also increased, with most KSH indicating they felt more capable of educating their community after the training.

The pre-test and post-test design has been widely recognized in health education programs as a reliable method to evaluate effectiveness (Sidabutar *et al.*, 2019). In this program, it not only served as an evaluation tool but also motivated participants to recognize their own learning progress. The findings were then shared back with participants during the closing session to encourage further commitment.

Flipchart Module in Practice

One of the most important components of the program was the integration of the flipchart into both training and future implementation by KSH. The flipchart served as a visual guide that simplified technical dental information into community-friendly messages. Each page covered one key topic:

1. What are antibiotics?
2. When are antibiotics necessary in dentistry?
3. Situations where antibiotics are not needed.
4. Risks of irrational antibiotic use.
5. Preventive oral health practices.
6. Key messages to share with the community.

During the training, cadres practiced flipping through the module while explaining the concepts to peers. Trainers emphasized the importance of not only reading from the flipchart but also using it as a tool to guide interactive conversations. This approach ensured that the cadre would be comfortable using the flipchart in real community sessions. Previous research has shown that visual aids such as flipcharts improve message retention among lay audiences and increase the effectiveness of health counseling.

RESULTS AND DISCUSSION

The evaluation of knowledge improvement among twelve Kader Surabaya Hebat (KSH) at Puskesmas Pegirian was assessed using pre-test and post-test scores. Each test consisted of ten structured questions, and the results are summarized in Table 1 and illustrated in Figure 1. The average pre-test score was 75.7, indicating that although most cadres already had a moderate level of knowledge, misconceptions remained in several key areas such as the risks of irrational antibiotic use and the importance of completing treatment as prescribed. After the training, the average post-test score increased significantly to 97.9, demonstrating a remarkable gain in understanding.

At the individual level, almost all cadres showed improvements in their scores. For instance, some participants who initially scored only 8 or 9 correct answers out of 12 in the pre-test were able to achieve nearly perfect scores in the post-test. This indicates that the Training of Trainers program was effective not only in reinforcing existing knowledge but also in correcting misunderstandings and building confidence in applying the concepts.The graphical comparison further highlights this pattern. In the pre-test, performance varied across cadres, with several participants scoring below 80%. In contrast, post-test results were consistently high, with nearly all cadres achieving above 90%. This uniformity suggests that the training successfully leveled knowledge among participants, ensuring that all cadres were equally prepared to deliver community education on rational antibiotic use in dentistry.

Table 1. Comparison of Pre-test and Post-test Results

Cadre No.	Correct Answers Pre-test (n=12)	Correct Answers Post-test (n=12)
1	1	9
2	3	8
3	10	10
4	10	10
5	10	10
6	8	10
7	9	10
8	10	10
9	10	10
10	9	10
11	8	10
12	8	10
Average	**75,7**	**97,9**

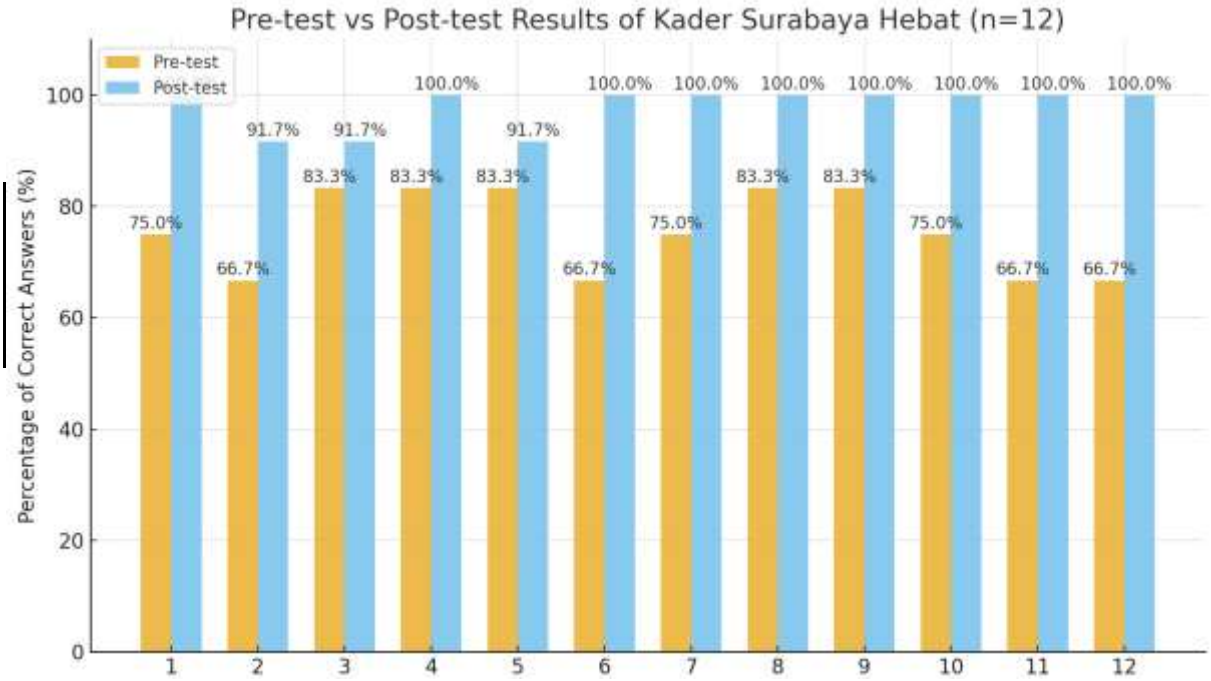

Figure 1. Comparison of Pre-test and Post-test Results of Kader Surabaya Hebat (KSH)

Statistical Analysis

The normality test was conducted using the Kolmogorov-Smirnov method to assess whether the pre-test and post-test data followed a normal distribution. The results showed that the pre-test had a p-value of 0.001, while the post-test had a p-value of 0.000. Since both values were below the significance threshold of 0.05, the null hypothesis that the data were normally distributed was rejected. This indicated that neither the pre-test nor the post-test scores met the assumption of normality, meaning that parametric tests could not be applied to analyze the data.

One-Sample Kolmogorov-Smirnov Test

		Pretest	Posttest
N		12	12
Normal Parameters[a,b]	Mean	8.00	9.75
	Std. Deviation	2.954	.622
Most Extreme Differences	Absolute	.333	.490
	Positive	.249	.344
	Negative	-.333	-.490
Test Statistic		.333	.490
Asymp. Sig. (2-tailed)		.001[c]	.000[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Diff	.293	12	.005	.743	12	.002

a. Lilliefors Significance Correction

Figure 2. Normality test

Further analysis was carried out on the difference between the post-test and pre-test scores. The results again demonstrated p-values below 0.05, indicating that the differences were

not normally distributed. The skewness value of -1.852 confirmed that the data were not symmetrical, which meant that the assumptions required for the Wilcoxon signed-rank test were not satisfied. Given these outcomes, the Sign Test was chosen as a more suitable non-parametric alternative for analyzing the data.

The application of the Sign Test produced a p-value of 0.016, which was below 0.05. This result led to the rejection of the null hypothesis, confirming that there was a statistically significant improvement in knowledge after the training. These findings show that the Training of Trainers program effectively enhanced the knowledge of Kader Surabaya Hebat at Puskesmas Pegirian, particularly in the rational use of antibiotics in dentistry. From both an academic and practical perspective, the results highlight the value of structured community-based education supported by visual learning tools in strengthening health literacy.

Descriptives

			Statistic	Std. Error
Diff	Mean		-1.75	.708
	95% Confidence Interval for Mean	Lower Bound	-3.31	
		Upper Bound	-.19	
	5% Trimmed Mean		-1.50	
	Median		-1.00	
	Variance		6.023	
	Std. Deviation		2.454	
	Minimum		-8	
	Maximum		0	
	Range		8	
	Interquartile Range		2	
	Skewness		-1.852	.637
	Kurtosis		3.286	1.232

Test Statistics[a]

	Posttest - Pretest
Exact Sig. (2-tailed)	.016[b]

a. Sign Test

b. Binomial distribution used.

Figure 3. Sign test

Figure 4. Documentation of community development activities

Figure 5. Flipchart cover rational antibiotic use for dentistry

The results of the Sign Test showed a p-value of 0.016, which was less than 0.05. This led to the rejection of the null hypothesis that there was no difference between pre-test and post-test scores. The finding indicates that the training produced a statistically significant improvement in knowledge. Beyond the statistical evidence, this outcome highlights the practical impact of the program. Cadres not only increased their overall scores but also showed remarkable improvements in areas where misconceptions were common, such as the risks of irrational antibiotic use, the importance of completing treatment regimens, and the dangers of sharing or reusing antibiotics. These results emphasize that structured training supported by visual tools like flipcharts is effective in conveying technical health information in a way that is accessible and memorable.

The improvement is particularly important given the global concern regarding antimicrobial resistance. Dentistry plays a meaningful role in antibiotic consumption, with inappropriate prescribing contributing to resistance patterns that undermine public health. Recent studies underline the importance of stewardship interventions that specifically target

dentists and their patients. Educational interventions in dentistry consistently improve prescribing practices and reduce unnecessary antibiotic use (Teoh *et al.*, 2025). The success of the intervention is also consistent with the broader literature on health education. Studies show that when health messages are reinforced with visual aids, participants are more likely to retain information and apply it in practice. Flipcharts, in particular, have been identified as effective tools for community-based education because they allow facilitators to structure discussions, simplify complex concepts, and encourage interactive communication. In this study, cadres practiced using the flipchart to explain concepts to peers, which not only improved their own understanding but also prepared them to lead community sessions with confidence. This participatory approach fosters active learning, which is widely recognized as more effective than passive instruction (Roganović *et al.*, 2024).

The findings have strong practical and academic implications. In many communities, inappropriate use of antibiotics stems from misinformation, cultural practices, and patient demand. Dentists often face pressure to prescribe antibiotics even when not clinically indicated, and public misunderstanding can exacerbate this challenge. Training cadres to deliver accurate, evidence-based messages to the public helps reduce misconceptions and support dentists in making rational prescribing decisions. Interventions of this kind can thus form part of broader antimicrobial stewardship strategies that bridge the gap between professional guidelines and community behavior. The methodology of this study also demonstrates the importance of selecting appropriate statistical tools. Choosing an unsuitable test for data that violates assumptions risks producing misleading conclusions (Goff *et al.*, 2022). The present research demonstrates that cadres, when well trained, can become important allies in stewardship efforts by shaping community expectations and reducing demand for unnecessary antibiotics. This bottom-up approach complements the top-down strategies of professional regulation and clinical guidelines (Gross *et al.*, 2019). During group discussions, many participants admitted that they had previously stored leftover antibiotics for future use. After receiving education, they acknowledged the risks of such practices, including reduced drug effectiveness and the possibility of resistance. This change in perception demonstrates the effectiveness of combining oral health education with antibiotic awareness in a community-based program (Ghafoor *et al.*, 2025).

The relevance of this program also relates to broader discussions about the place of oral health within public health. The authors' previous work has highlighted the close relationship between oral health and systemic health. One example is the link between early childhood caries and stunting, which shows that oral conditions can influence overall growth and development (Ameliana *et al.*, 2025). Irrational use of antibiotics often carries not only clinical risks but also ethical and legal consequences (Fauziah, Alhadad and Susanto, 2025). Research on the integration of technology and innovation in dentistry has provided insights into how capacity building and education can be strengthened to improve community engagement (Darmadi *et al.*, 2024; Fauziah *et al.*, 2025). The program contributed not only to improving knowledge but also to encouraging behavioral change. The involvement of health cadres ensured that the messages delivered could be reinforced in the long term, making the impact sustainable for the community.

This approach addresses existing problems such as overprescribing in dental care, inadequate understanding of antibiotic principles, and weak community education capacities.

The need is urgent given that up to eighty percent of dental antibiotic prescriptions may be unnecessary, as shown in analyses of outpatient dental practice. By empowering KSH (Kader Surabaya Hebat) with evidence-based knowledge and tools, the program aims to transform community practice, reduce irrational antibiotic use, and contribute to broader efforts against antimicrobial resistance at the grassroots level.

CONCLUSION

The Training of Trainers program implemented for Kader Surabaya Hebat at Puskesmas Pegirian proved effective in significantly improving knowledge about rational antibiotic use in dentistry. The pre-test and post-test analysis confirmed a clear increase in understanding, with statistical testing demonstrating meaningful differences. This outcome highlights that structured training supported by visual learning tools, such as flipcharts, can successfully build the capacity of community health cadres to deliver accurate and consistent health messages. Strengthening the role of cadres through targeted education not only corrects misconceptions but also contributes to broader antimicrobial stewardship efforts in dentistry. Investing in community-based education is therefore a sustainable and impactful strategy to reduce irrational antibiotic use and to support public health initiatives at the grassroots level.

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