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Health Education on Infection Prevention for Families of Hospitalized Patients: A Community Service Program

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Abstract

Family members frequently remain at the bedside of hospitalized patients and may participate in basic care, food assistance, mobility support, and contact with the patient environment. Their infection-prevention practices therefore influence patient safety and the wider hospital environment. This community service program aimed to improve families' knowledge and practical skills regarding infection prevention, particularly hand hygiene, respiratory hygiene, environmental cleanliness, and appropriate use of personal protective equipment (PPE). The activity used health education, demonstration, return demonstration, discussion, and bedside mentoring. A pretest-posttest evaluation was conducted among 30 family caregivers of hospitalized patients. The mean knowledge score increased from 58.7 before education to 86.3 after education. The proportion of participants achieving the predefined good-knowledge category increased from 26.7% to 90.0%. Practical observation also showed improvement in correct hand-rub/hand-washing technique and recognition of critical hand-hygiene moments. Participants reported that demonstration and direct feedback were more useful than lecture alone. A brief, family-centered infection-prevention education package can strengthen knowledge and practical skills among family caregivers. Integration of family education into routine hospital admission and bedside communication may support a safer care environment, although longer-term observation is needed to determine whether the observed improvement is sustained.

Keywords: Family caregivers, hand hygiene, health education, infection prevention, hospital

Introduction

Health care-associated infections (HAIs) remain a major patient-safety problem because they can occur during or as a consequence of receiving health services and may

result in prolonged hospitalization, additional treatment, increased costs, disability, and preventable death. The World Health Organization (WHO) emphasizes that infection prevention and control (IPC) is a practical, evidence-based approach that must involve patients, health workers, managers, and other people who enter health-care settings. The 2024 global report on IPC further identifies HAIs as a daily threat in hospitals and highlights the importance of reliable IPC programmes, water, sanitation and hygiene (WASH), and implementation of evidence-based precautions.[1],[2] The problem is especially important in settings where hospitals depend on family members to remain with patients and assist with daily care.

Hospitalized patients are surrounded by multiple potential routes of microorganism transmission. Pathogens may move through direct contact, contaminated hands, frequently touched surfaces, respiratory droplets or aerosols, shared equipment, food, body fluids, and inappropriate handling of waste. Hand hygiene is therefore a central component of IPC. WHO identifies five key moments for hand hygiene in health care: before touching a patient, before a clean or aseptic procedure, after body-fluid exposure risk, after touching a patient, and after touching the patient's surroundings.[3],[4] Although these moments were originally operationalized strongly for health-care workers, the underlying principle is equally relevant to family members who touch patients, assist with feeding or mobilization, handle personal items, or enter and leave patient rooms.

Family members are not merely visitors. In many hospitals, particularly in low- and middle-income countries, a family caregiver may stay for long periods, provide emotional support, assist with personal hygiene, help the patient eat and drink, accompany the patient during procedures, and interact with the bedside environment. This creates opportunities for both protective and harmful behaviors. A family caregiver who cleans the hands before patient contact and after contact with potentially contaminated materials can interrupt transmission. Conversely, a caregiver who moves between the patient, mobile phone, food, door handles, and other surfaces without hand hygiene may become an unnoticed link in a chain of transmission. Recent evidence directly involving family caregivers confirms that they have frequently been overlooked in hospital IPC strategies, even though their behavior can affect patient safety.[5]

Evidence from studies involving patients, families, and visitors demonstrates

that knowledge and self-reported behavior do not necessarily correspond to observed practice. A descriptive study in pediatric and maternity hospitals reported an overall observed hand-hygiene rate of only 10.3% among patients, family members, and visitors, despite comparatively favorable self-reported practices.[6] This gap is important because health education that only transfers information may not be sufficient. Families need clear explanations of why infection prevention matters, simple instructions that can be remembered during stressful hospital stays, opportunities to practice the recommended technique, and feedback that corrects misconceptions.

Interventional studies support the value of actively engaging hospital visitors and families. An educational speech intervention increased visitor hand-hygiene compliance from 9.73% at baseline to 87.06% after the intervention in one hospital-based study.[7] A stepped-wedge cluster randomized trial in a pediatric hospital also found that patient and visitor hand-hygiene interventions could improve observed practice, with a front-line ownership approach producing greater improvement than a conventional poster-and-education approach.[8] Interactive educational interventions have likewise been associated with increased hand-hygiene compliance among children and visitors.[9] These findings suggest that family education should move beyond passive posters and should incorporate interpersonal communication and practical demonstration.

Behavioral determinants also matter. Visitors may fail to perform hand hygiene because dispensers are difficult to notice, because they forget, because their hands are occupied, or because they underestimate the consequences of contamination. At the same time, perceived risk, social norms, motivation, and knowledge can facilitate the desired behavior.[10],[11] A recent study using the Health Belief Model among family caregivers found that knowledge, perceived benefits and barriers, age, and sanitizer use were associated with hand-hygiene performance.[12] This provides a useful rationale for designing community service interventions around perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and confidence in performing the behavior correctly.

Hand hygiene education should also be technically accurate. Alcohol-based hand rub is appropriate when hands are not visibly soiled and is an efficient option at the point of care, whereas soap and water are required in situations where hands are

visibly dirty and in other specific circumstances defined by local IPC guidance.[3],[4] The WHO technique emphasizes covering all hand surfaces rather than simply rubbing the palms. An updated systematic review found evidence that the WHO six-step technique reduces microbial load, although the evidence base remains heterogeneous and the most feasible technique may depend on the setting.[13] Thus, family education should emphasize complete coverage, sufficient duration, and correct timing rather than treating hand hygiene as a symbolic action.

Education should be integrated into a broader IPC system. WHO core components describe IPC programmes as requiring guidelines, education and training, surveillance, multimodal strategies, monitoring and feedback, staffing and workload considerations, and an appropriate built environment with materials and equipment for hand hygiene.[14] The WHO 2024 IPC education curriculum similarly emphasizes competency-based learning and includes people involved in health-care delivery and support.[15] For families, this means the hospital should provide accessible hand-hygiene facilities, visible reminders, consistent messages from staff, and a simple mechanism for caregivers to ask questions and receive feedback.

The importance of multimodal approaches is supported by the broader hand-hygiene literature. A comprehensive systematic review of clinical trials reported between 2014 and 2020 found that most studies used the WHO multimodal framework or a variation of it and concluded that both single and multimodal interventions can produce improvements, although the magnitude is often modest.[16] A meta-analysis and logic model found that multilevel interventions addressing individual, interpersonal, and organizational determinants had the strongest potential to improve hand-hygiene compliance.[17] Behavioral interventions targeting nurses also show that strategies that address motivation, social influence, environmental cues, and self-efficacy can contribute to improvement.[18] These findings are relevant to family education because caregivers operate within the same physical and social environment as health workers and patients.

The present community service program was developed in response to the practical need to position families as partners in infection prevention rather than passive recipients of hospital rules. The program combined a short explanation of infection transmission with demonstration, return-demonstration, visual reminders, question-and-

answer discussion, and bedside mentoring. The content covered hand hygiene, respiratory hygiene and cough etiquette, safe contact with the patient environment, appropriate glove use, waste handling, and situations in which caregivers should ask health workers for assistance. This approach differs from education that relies only on printed information because it creates an opportunity to observe behavior and correct technique immediately.

The novelty of this activity lies in integrating family-centered health education with direct skills practice at the bedside and evaluating both knowledge and practical performance in the same session. The approach is also deliberately designed to be feasible in routine hospital workflows: the educational package can be delivered in a short session, uses materials that are inexpensive, and can be reinforced by nurses or IPC staff. This is important because a sustainable intervention should not depend on specialized equipment or lengthy classes. Recent evidence from Bangladesh further demonstrates the potential value of including family caregivers in hospital IPC interventions; a 2026 pilot study reported substantial improvement in hygiene compliance among family caregivers after an IPC intervention.[5] The current activity therefore seeks to translate the broader evidence into a practical community service model that can be adapted to Indonesian hospitals.

The purpose of this community service was to improve the knowledge and practical skills of family caregivers regarding infection prevention during hospitalization. Specifically, the activity sought to: (1) increase understanding of how infections can be transmitted in hospital environments; (2) improve recognition of critical hand-hygiene moments; (3) improve the accuracy of hand-washing and alcohol-based hand-rub technique; (4) strengthen respiratory hygiene, environmental cleanliness, and appropriate PPE practices; and (5) encourage families to become active partners in maintaining a safe hospital environment.

Method

This community service used a participatory health-education design with a one-group pretest-posttest evaluation. The activity was conducted in an inpatient unit of a partner hospital in Indonesia. The target population was family caregivers who accompanied hospitalized adult patients and were involved in bedside assistance. Thirty

participants were included using consecutive recruitment during the implementation period. Participation was voluntary, and participants were informed that the activity was educational and that their evaluation results would be reported in aggregate. No patient-identifying information was collected.

The intervention was organized into four sequential stages. First, a brief situational assessment was performed through informal discussion with families and nurses to identify common infection-prevention questions and barriers. Second, participants completed a 20-item knowledge questionnaire covering routes of infection transmission, the five key moments for hand hygiene, indications for soap-and-water handwashing versus alcohol-based hand rub, respiratory hygiene, safe handling of personal items, environmental cleanliness, waste disposal, and appropriate use of gloves and masks. The questionnaire was scored from 0 to 100. Knowledge was categorized as poor (<60), moderate (60–79), or good (≥80).

Third, the education session was delivered using a combination of a short interactive lecture, illustrated posters, demonstration, discussion, and return-demonstration. The facilitator explained how microorganisms may be transferred between hands, patients, surfaces, food, mobile phones, and other objects. The WHO five moments were translated into family-friendly examples, such as cleaning hands before touching the patient, before helping with feeding or wound-related tasks, after contact with body fluids, after direct patient contact, and after touching the bed area or other patient surroundings. Participants were shown the recommended hand-rub and hand-washing sequence, followed by supervised practice. The session also covered cough etiquette, keeping personal items away from potentially contaminated surfaces, correct glove use, and asking health workers for assistance when a task involves procedures beyond the caregiver's role.

Fourth, each participant performed a return-demonstration. Facilitators used a structured checklist to observe preparation, timing, coverage of hand surfaces, completion of the sequence, and avoidance of recontamination. Immediate feedback was provided in a supportive manner, and participants repeated the steps when a critical error was identified. A short posttest using the same competency domains was administered after the session. Participants also completed a brief acceptability questionnaire addressing clarity, usefulness, opportunity to practice, and intention to

apply the behavior during the hospital stay.

The primary outcome was change in knowledge score between pretest and posttest. Secondary outcomes were the proportion of participants in each knowledge category, the proportion correctly completing the hand-hygiene return-demonstration, and participants' perceived usefulness of the intervention. Descriptive statistics were used to summarize participant characteristics and outcome distributions. Mean scores were compared descriptively because the activity was designed primarily as a community service evaluation rather than a controlled clinical trial. The intervention was implemented in accordance with the partner hospital's IPC rules and with attention to hand-hygiene product availability and local safety procedures.

To improve transfer to daily behavior, participants received a one-page reminder sheet that could be kept at the bedside or in a personal bag. The reminder used simple language and visual cues, emphasizing when to clean hands, how to perform the technique, and when to seek assistance from health workers. The educational team encouraged family members to remind one another respectfully and to model the behavior for other visitors. This peer-support element was intended to create a small social norm around clean hands within the patient's immediate care environment.

Results

The community service involved 30 family caregivers of hospitalized patients. Most participants were women (70.0%), and the largest age group was 40–59 years (46.7%). Twenty-four participants (80.0%) had completed senior high school or higher, while 18 (60.0%) reported previous experience accompanying a hospitalized family member. The participants were therefore a mixed group in terms of age and prior hospital experience, but most had sufficient literacy to engage with the visual and written educational materials.

Baseline assessment showed that knowledge of infection prevention was not consistently adequate. Participants generally recognized that handwashing is important, but several had difficulty identifying the situations in which hand hygiene should be performed and distinguishing between routine hand hygiene and the use of gloves. Some participants believed that wearing gloves made hand hygiene unnecessary, while others considered hand hygiene primarily necessary after contact with visible dirt. These

findings were addressed during the education session by linking infection-prevention actions to specific caregiving activities.

The mean knowledge score increased from 58.7 before the intervention to 86.3 after the intervention, representing a 27.6-point increase. At baseline, 8 participants (26.7%) achieved the good-knowledge category, 14 (46.7%) were in the moderate category, and 8 (26.7%) were in the poor category. Following education, 27 participants (90.0%) achieved the good-knowledge category and 3 (10.0%) achieved the moderate category; no participant remained in the poor category. The largest improvements were observed in questions concerning the five key moments, indications for alcohol-based hand rub, and the role of hand hygiene after touching the patient environment.

Practical skills also improved during return-demonstration. Before corrective feedback, 17 of 30 participants (56.7%) completed the hand-hygiene sequence without a major procedural error. After demonstration and supervised practice, 28 participants (93.3%) completed the sequence correctly according to the checklist used by the facilitators. Common initial errors included insufficient rubbing of the backs of the hands and between the fingers, touching potentially contaminated surfaces immediately after cleaning the hands, and failing to recognize that hand hygiene is needed after touching the patient's surroundings.

Participants also demonstrated better recognition of respiratory hygiene and environmental precautions. At the end of the session, 28 participants (93.3%) could identify appropriate cough etiquette, 27 (90.0%) could describe at least two high-touch surfaces that require attention, and 26 (86.7%) correctly stated that gloves do not replace hand hygiene. Twenty-nine participants (96.7%) stated that they would ask a nurse or other health worker for help when a caregiving activity involved a procedure beyond their role. These findings suggest that the intervention improved not only factual knowledge but also understanding of the boundaries of family caregiving.

Acceptability was high. Twenty-nine participants (96.7%) rated the education as easy to understand, 28 (93.3%) considered the demonstration useful, and 29 (96.7%) reported that they intended to apply the practices during the remainder of the hospital stay. Participants particularly valued examples that were directly connected to bedside activities rather than abstract explanations. Several participants requested that the hospital provide a short infection-prevention orientation when family members first

begin staying with a patient.

The activity also identified implementation challenges. The most frequently mentioned barriers were forgetting to clean the hands when moving quickly between tasks, uncertainty about whether alcohol-based hand rub was available at all points of care, and reluctance to remind other family members because they did not want to appear impolite. These observations indicate that education alone should be supported by environmental cues, accessible supplies, and a culture in which patients and families are encouraged to participate in safety practices.

Overall, the community service achieved its immediate educational objectives. Knowledge scores improved, more participants reached the good-knowledge category, and observed technique during return-demonstration improved after practical instruction. Because the evaluation was conducted immediately after the intervention and did not include a control group or long-term follow-up, the results should be interpreted as short-term program outcomes rather than evidence of sustained behavioral change or a reduction in HAIs.

Table of Participants

Characteristic	**n**	**%**
Female caregiver	21	70.0
Male caregiver	9	30.0
Age 18–39 years	13	43.3
Age 40–59 years	14	46.7
Age ≥60 years	3	10.0
Senior high school or higher	24	80.0
Previous hospital caregiving experience	18	60.0

Discussion

The present community service demonstrates that a brief, family-centered infection-prevention education package can produce substantial short-term gains in knowledge and practical hand-hygiene skills. The increase in mean knowledge score from 58.7 to 86.3 and the movement of 90.0% of participants into the good-knowledge category indicate that the educational content was understandable and relevant to the caregivers' immediate needs. Importantly, the improvement was not limited to recall of facts. During return-demonstration, the proportion of participants completing the hand-hygiene sequence without a major error increased from 56.7% to 93.3%. This

combination of knowledge transfer and observed skill practice is consistent with the principle that IPC education should develop practical competence rather than merely provide information.

The findings are particularly relevant because families occupy a distinctive position in the hospital care environment. Unlike occasional visitors, family caregivers may remain for hours or days and can be involved in feeding, mobility, personal care, and handling the patient's belongings. Their repeated contact with both the patient and surrounding surfaces creates numerous opportunities for transmission. Recent evidence has explicitly identified family caregivers as an overlooked component of hospital IPC. In a 2026 pilot study in Bangladesh, an IPC intervention among family caregivers was associated with an almost threefold increase in observed hand-hygiene compliance, although the absolute post-intervention compliance remained relatively low.[5] The current activity supports the same conceptual direction: family caregivers should be recognized as partners in IPC and should receive structured, practical support rather than being expected to infer hospital hygiene rules on their own.

The baseline findings also reinforce the distinction between knowing that hand hygiene is important and knowing when and how to perform it. Participants in this activity generally understood the broad message that handwashing prevents infection, but several were uncertain about the five critical moments and about the relationship between glove use and hand hygiene. Similar gaps have been documented in studies of patients, families, and visitors. In a descriptive study, observed hand-hygiene practice was much lower than self-reported practice, suggesting that people may overestimate their own adherence or may interpret the behavior differently from trained observers.[6] A study of hospital visitors using behavioral theories found that visibility of dispensers, forgetfulness, perceived risk, motivation, norms, and knowledge were relevant to observed behavior.[10] These findings help explain why an intervention should combine information with environmental cues and supervised practice.

The large immediate improvement after education is also compatible with evidence from visitor-focused interventions. Educational speech increased visitor hand-hygiene compliance dramatically in one hospital study, from 9.73% to 87.06%.[7] A pediatric hospital trial showed that patient and visitor hand-hygiene rates could be improved through intervention, with front-line ownership producing better results than

conventional poster-based education alone.[8] Interactive education for children and visitors similarly increased observed compliance and awareness.[9] Together, these studies indicate that interpersonal engagement is a valuable mechanism. The present program used a short explanation followed by demonstration and return-demonstration, which may explain why participants were able to correct procedural errors during the same session.

The practical emphasis is also supported by evidence concerning the quality of hand-hygiene technique. An updated systematic review commissioned by WHO found that the WHO six-step technique reduces microbial load on hands, while also noting heterogeneity and limitations in the available evidence.[13] In a family education setting, it is therefore more useful to teach participants to cover all hand surfaces and to recognize the correct moments than to encourage a superficial ritual. The facilitators in this activity observed common errors such as incomplete coverage of the backs of the hands and spaces between fingers. Correcting these errors through return-demonstration is an important advantage over education delivered solely through posters or leaflets.

The intervention also emphasized that gloves do not replace hand hygiene. This point is important because caregivers may perceive gloves as a complete barrier and therefore neglect hand cleaning. WHO guidance and contemporary IPC recommendations consistently position hand hygiene as fundamental and describe gloves as an additional protective measure when indicated by exposure risk.[3],[4] The educational session therefore framed PPE as part of a hierarchy of precautions rather than as a substitute for basic hygiene. This approach can reduce false reassurance and help families understand that inappropriate glove use may create new opportunities for contamination when gloves are worn between tasks or when clean hands are not maintained.

The results concerning respiratory hygiene and environmental cleanliness are equally important. Infection prevention at the bedside is not limited to the hands. Family members may touch mobile phones, door handles, bed rails, tables, remote controls, food containers, and other frequently touched surfaces. Respiratory hygiene, appropriate disposal of tissues and waste, and limiting unnecessary movement of contaminated items are complementary behaviors. WHO's recent guidance emphasizes the integration of IPC with WASH and environmental measures, while specific operational guidance

for infectious diarrheal disease also highlights hygiene infrastructure, waste management, food safety, and infection-control practices.[2,19] The present activity incorporated these elements in simple terms so that caregivers could connect infection prevention with everyday actions.

The high acceptability of the session suggests that families may be receptive to being included in hospital safety activities when the communication is respectful and practical. Nearly all participants rated the session as understandable and useful, and most stated that they intended to continue the practices. This is consistent with the idea that social norms and cues to action can strengthen behavior.[10,12] The intervention also encouraged family members to remind one another, which may create interpersonal reinforcement. However, the reluctance of some participants to remind other visitors indicates that empowerment requires not only knowledge but also permission from the hospital. Staff should explicitly communicate that patients and families are welcome to ask whether hand hygiene has been performed and to request help when they are unsure about an infection-prevention practice.

The broader IPC literature indicates that education is most effective when it is embedded in a multimodal system. A comprehensive review of hand-hygiene clinical trials found that many successful studies adopted the WHO multimodal framework, while a meta-analysis showed that multilevel strategies addressing individual, interpersonal, and organizational factors may have the greatest potential to improve compliance.[16,17] A systematic review of behavioral interventions among nurses likewise identified the importance of behavior-change mechanisms rather than relying on information alone.[18] These findings support the structure of the present program, but they also highlight its limitations: a single education session cannot by itself solve environmental barriers, supply problems, workload pressures, or inconsistent reminders.

An important strength of the program is its feasibility. The intervention can be delivered in a short period using a standard script, a poster or handout, alcohol-based hand rub and soap-and-water facilities, and a simple observation checklist. This makes it potentially suitable for inclusion in routine admission education, especially when a family member is expected to remain at the bedside. The WHO 2024 IPC education curriculum emphasizes competency-based learning and the need to equip people involved in health-care delivery with practical IPC knowledge and skills.[15] A family-

focused module could therefore complement staff training without requiring families to master professional-level IPC content.

Another strength is the focus on the family as a unit of care rather than as an isolated individual. Hospitalized patients often depend on relatives for support, and family members influence each other's behavior. By asking participants to model good practice and remind one another, the intervention moves toward a small-scale social-norm intervention. This is consistent with evidence that behavioral and contextual factors can influence visitor hand hygiene.[10],[11] Nevertheless, the effect of this approach needs to be tested over longer periods. The current evaluation occurred immediately after education, so it cannot determine whether knowledge remains high after several days or whether caregivers continue to practice hand hygiene when the immediate attention of facilitators is absent.

The program also has limitations that should be considered when interpreting the findings. The sample was small, selected from one hospital setting, and did not include a comparison group. The outcomes were measured immediately after the intervention, and practical performance was assessed during a supervised return-demonstration rather than through prolonged covert observation. Consequently, the findings cannot be generalized to all hospitals and cannot establish that the intervention reduces HAIs. The use of a self-reported intention measure may also overestimate future adherence. Future activities should include larger samples, repeated observations, follow-up assessments at discharge, and, where feasible, monitoring of family hand-hygiene opportunities and hospital IPC indicators.

Despite these limitations, the activity provides a practical model for strengthening patient and family participation in hospital safety. The key innovation is not a new infection-control technology but the deliberate integration of family education, demonstration, return-demonstration, and bedside mentoring. The model translates evidence on visitor and caregiver behavior into an implementable routine. The approach may be particularly valuable in hospitals where family caregivers are deeply involved in daily patient support and where health workers have limited time for repeated education.

In future implementation, the hospital should consider incorporating a short family IPC orientation into the admission process; placing hand-hygiene products at

visible points of care; using simple, multilingual or culturally appropriate reminders; encouraging staff to provide brief verbal cues; and periodically auditing family hand-hygiene opportunities. The intervention could also be adapted for pediatric wards, maternity wards, medical-surgical units, and isolation areas, with additional content according to patient risk. APIC's patient hand-hygiene toolkit provides an example of how observation tools can be adapted to patient/resident settings, including moments such as before eating, after toileting, before and after contact with devices or dressings, and before entering or leaving a room.[20]

Overall, the findings support a shift from viewing family members as potential sources of contamination to recognizing them as active IPC partners. This change in perspective is consistent with the WHO position that effective IPC requires action at every level of the health system and involvement of people who access health services.[1,2] The immediate gains observed in this community service indicate that families can learn and demonstrate key practices when the hospital provides clear expectations, practical teaching, and supportive feedback. The next step is to institutionalize the education within routine hospital systems and determine whether improved knowledge and technique translate into sustained behavior and safer patient outcomes.

Conclusion

The family-centered infection-prevention education program improved participants' immediate knowledge and practical hand-hygiene skills and increased their understanding of respiratory hygiene, environmental cleanliness, glove use, and when to seek assistance from health workers. The combination of interactive explanation, demonstration, return-demonstration, and bedside mentoring was feasible and well accepted. Families should be positioned as active partners in hospital IPC, with education reinforced through accessible hand-hygiene facilities, visual cues, staff reminders, and routine follow-up. Further evaluation with larger samples and longer observation

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Conflict of Interest

The authors declare no conflict of interest related to this community service activity or manuscript.

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