THE EVIDENCE-BASED OPERATIONAL MODEL: describes a guideline implementation and a follow-up based on evidence.

Hand hygiene practice evaluation and development
Attachments

EVIDENCE-BASED MODEL

Hand hygiene practice evaluation and development

The model includes the following supportive material:

Education
Attachment 1
Observer training programme ........................................... 20

Data collection
Attachment 2
Observation sheet ................................................................ 21
Attachment 3
Instructions for observation ................................................. 22
Attachment 4
Informing staff ...................................................................... 23
Attachment 5
An example of hand hygiene implementation ......................... 24
Attachment 6
An example of hand hygiene implementation in iv cannula insertion .............................................................. 25

Video on spread of infection:
https://www.youtube.com/watch?feature=player_embedded&v=2PuRQZEL1oU

Penn State Hershey Medical Center-
Infectious Diseases, Hospital Epidemiology,
and Infection Prevention, USA
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Introduction

Good hand hygiene reduces the number of care-associated infections. The operational model devised for the evaluation and development of hand hygiene practices is based on evidence on the effect of hand hygiene on patients’ outcomes. The operational model has been informed by the Model for Consistent Practices (the YHKÄ model)\(^1\) as well as research regarding the adoption and dissemination of evidence-based practices.\(^2\)\(^-\)\(^5\)

The handbook is intended to support social and health care organizations in developing evidence-based practices from the viewpoint of hand hygiene practices. The model is free for use for social and health care organizations and is available at (www.hotus.fi). The handbook is for evaluation of hand hygiene, and is not meant to serve as a set of instructions for how to carry out hand hygiene, since comprehensive national and local instructions on the subject already exist (e.g. http://www.sshy.fi/index.html).

In order to evaluate the usability and to develop the operational model kindly refer to the source as Nursing Research Foundation about adopting the operational model or its parts (anne.korhonen@hotus.fi). Using the operational model and its supporting material (such as observation form) requires appropriate references.

The aim of the operational model

The aim of the KhYHKÄ operational model is to strengthen patient safety in social and health care organizations by means of influencing hand hygiene practices. The model gives an evidence-based structure and guides towards systematic and constant monitoring of practices as well as rapid provision of feedback and subsequent changes in practices.

Operational model developers

The operational model has been developed as a collaborative project with the Oulu University Hospital (OYS) and the Nursing Research Foundation (Hotus) with funding from Finland’s Slot Machine Association (RAY).

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The evidence behind the operational model

The KhYHKÄ operational model is based on strong and consistent evidence relating to the effectiveness of hand hygiene on the outcomes of care and on evidence relating to implementation methods to enhance change in hand hygiene practices.

• Good hand hygiene is an effective way to prevent hospital-associated infections (HAIs) (Grade A).

• Its implementation is guided by many evidence-based recommendations⁵–⁸ as well as guidelines of the Finnish Society for Hospital Infection Control for hand hygiene implementation that are based on, and in line with, the recommendations⁹. The recommendations given by the hospital infection control unit are based on the guidelines above.

• Behind the operational model is evidence about the positive correlation between complex interventions and hand hygiene compliance of the health care staff ⁸,¹⁰ (Grade A). Single interventions, such as education, are not considered effective in changing the behaviour of health professionals. Interventions using multidimensional approaches may be efficient in changing hand hygiene practices.⁵,⁸,¹¹,¹²

• Combined with feedback, evaluation of practices has been utilized in many health care development projects. According to a systematic review¹² and international expert panel¹³, audit and feedback can be effective in changing the behaviour of the staff when there are failures in practice, when the feedback is given by a supervisor or a colleague, and when the feedback is given repeatedly in both oral and written form. In addition, the feedback should include a clear goal and a plan for attaining the goal.

• In the KhYHKÄ operational model, hand hygiene performance is evaluated as the length of hand disinfection and using a wristwatch, rings and inappropriate nails. These indicators are based on the evidence that only sufficient length of disinfection is effective to prevent the transfer of microorganisms via hands.¹⁴–¹⁶

Grade of recommendation

A = strong research evidence
THE EVIDENCE BEHIND THE OPERATIONAL MODEL

Operational model

The principle of continuous quality improvement is the foundation for the operational model.\textsuperscript{14,15}

The model works at different levels:

The model works at quality management level consisting of three phases:

1. Regular observation of hand hygiene performance
2. Giving feedback
3. Starting improving actions based on the results

In addition, the model works as an intervention, maintaining awareness about the meaning of good hand hygiene for patient safety care through repeated attention on the issue. Regular feedback may change the social norms in organizations and work communities towards evidence-based hand hygiene practices.

• The trigger for starting hand hygiene improvement may come from different sources, such as hospital-wide or unit-based outcomes and statistics indicating high rates of HAIs as well as from clinical experiences relating to variation of practices in patient care. In addition, new guidelines or protocols may require evaluation of current hand hygiene practices. The hospital Infection Control Unit and the department heads and supervisors are responsible for responding to the trigger.
DESCRIPTION OF THE OPERATIONAL MODEL

- A liaison/hospital hygiene nurse designated by the Infection Control Unit of the organization is in charge of carrying out the operational model (Fig. 1), working in cooperation with other parties.
- The role of department heads and supervisors in adopting and establishing the operational model is crucial, considering that they manage and control the resources for evaluation and development of evidence-based practices within their area of operations.

The operational model especially emphasizes supporting the activities of the units’ infection prevention liaisons (allocation of time and cooperation in developing operations).

- The unit’s infection liaisons gather data on hand hygiene practices in work units and use it to produce feedback data. They also participate in developing hand hygiene practices in cooperation with their heads of unit.
- The infection prevention unit provides his or her expertise to support developing practices as needed.

- The core process of the KhYHKÅ operational model consists of a cycle that starts with the observation of hand hygiene and the generation of feedback, proceeding to corrective measures that are undertaken based on the feedback. The cycle is repeated regularly within the organization, at jointly agreed intervals. The key element is adequate observation frequency, which makes it possible for evidence-based hand hygiene practices to be adopted as a norm in everyday work.

Figure 1. Consistent operational model for monitoring hand hygiene practices
The operational model can be utilized or applied in all social and healthcare sectors and units.

It can be implemented as such by utilizing common performance development programs, spreadsheets or by combining it with tools developed for enhancing evidence-based practice, such as those developed by the Joanna Briggs Institute (www.joannabriggs.org) as for example the JBI-PACES-program.

The model is founded on the structures of the organization’s infection control, and the Infection Control Unit is responsible for carrying out its implementation in collaboration with organization managers and immediate superiors.

The operational model is suitable in all social- and health care units.
Data management

- Using the KhYHKÄ operational model produces data about hand hygiene practices, practices which require development, and the effectiveness of corrective actions on hand hygiene performance. The infection liaison nurses are responsible for data management together with the hospital Infection Control Unit. Consensus on data management practices and responsibilities is necessary in the organization. At the work unit level, the infection control liaisons agree with their supervisors about the ways of collecting, archiving and informing staff about hand hygiene data.

- The infection liaisons collect and record the data they have observed, analyse them and provide feedback for the unit as agreed. They also send the data to organization’s Infection Control Unit, where the organization’s hygiene nurses synthetize data about hand hygiene practices and needs for development for administrative decision-making at organization level.

Using the operational model produces data about hand hygiene practices.
Staff

The involvement of different parties is essential for implementing the KhYHKÄ operational model into practice:

- The staff in the Infection Control Unit of the organization
- The department and work unit heads
- Supervisors
- The units’ infection prevention liaisons

Table 1. Stages of the operational model and responsibilities of different actors

<table>
<thead>
<tr>
<th>STAGE</th>
<th>ACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Decision on development and setting up working groups</td>
<td>Directors, immediate superiors</td>
</tr>
<tr>
<td>2. Ensuring competence: Training and resourcing observers</td>
<td>Infection prevention unit Directors, immediate superiors Trainer</td>
</tr>
<tr>
<td>3. Observation</td>
<td>Infection liaisons</td>
</tr>
<tr>
<td>4. Recording, analysing, and reporting on findings</td>
<td>Infection liaisons</td>
</tr>
<tr>
<td>5. Development measures and plans on further action</td>
<td>Infection liaisons, in cooperation with directors and immediate supervisors, with support from infection prevention unit if needed.</td>
</tr>
</tbody>
</table>
Competence of the units’ infection prevention liaisons

• The premise of the model is that the unit’s infection prevention liaison, who is going to observe hand hygiene, has the competencies needed for observing and providing feedback.

• If the organization does not have an infection prevention liaison network, it is recommend to make sure that each of the units has a person with sufficient knowledge about the meaning of good hand hygiene. She or he should also have competence to implement the operational model.

• In addition to common theoretical education it is important for infection prevention liaisons to have training related to observing and providing feedback. The aim of the training is to ensure sufficient skills of the observers, who apply ethical principles during the whole process and are competent actors in reporting and developing hand hygiene.

Ensuring staff’s hand hygiene competence

• In order to develop hand hygiene, it is important to ensure that staff have competence and are up-to-date when it comes to hand hygiene practices. Multidimensional interventions are more effective in improving hand hygiene practices than interventions focused on a single issue, such as education.

• For example, it is possible to combine training given by the Infection Control Unit staff with a “blue-light box”. This combination can be used to demonstrate success in performance. Similarly effective are interventions consisting of guidance at bedside, reminders and posters combined with other methods.

The aim of the training is to ensure sufficient competencies needed for observing.

In addition, “the blue-light box” can be used to demonstrate success in hand hygiene.
Implementation plan

The implementation plan consists of organizing the operational model

• (the roles and responsibilities of the actors)
• resources
• concrete actions (who, density of observations)
• the responsibilities of giving feedback as well as methods to monitor change
Organizing the implementation of the operational model

• The organizing of the operational model is managed by the heads and supervisors responsible for resourcing implementation.

• The organization’s Infection Control Unit is responsible for ensuring the competence needed in the implementation.

• The organization heads and supervisors are responsible for informing staff about the need to improve hand hygiene and for decisions to put the operational model into action.

• Emphasizing the responsibility of informing staff is manifested as managerial involvement in improving the practices.

• In addition, information given by the heads and supervisors gives the infection liaison nurses a mandate to observe hand hygiene practices as part of their duties.

The resources needed in implementation

• Resourcing includes ensuring the infection liaisons’ competency as well as the time resources needed for observation and reporting. In practice, the amount of time needed depends on the number of observations intended. For example, based on the experiences of the observers, the monthly collection of a sample of ten observations per each of the criteria and data recording requires approximately 4-6 working hours.

• Repeating a small sample generates a lot of deal high-quality feedback data on annual level.

• It is important to note that the validity of observation requires that the focus is on observing, which is not possible along normal patient care.

• Resourcing the operational model includes the support required by the infection liaison nurses. In this case, support means opportunities for debriefing, i.e., discussing experiences that have accumulated during observation with supervisors and other observers. The meaning of debriefing is based on the fact that professionals may feel themselves exceptionally vulnerable as their performance is being observed.

• Resourcing also includes acquisition of the tools needed in observation, such as writing tablets and stopwatches.
Implementation in practice

• The premise of the implementation the operational model is that all staff within the organization are informed about its adoption.

• In informing, the meaning of the observation on patient safety practices are emphasized as well the organization’s obligations to develop evidence-based practices throughout the organization. In addition, emphasizing the fact that good hand hygiene practices concern everyone working in patient care is needed.

• At organizational level, the following is agreed on: the density of observation, providing feed-back and the responsibilities relating to planning and implementing the corrective actions needed.

• The time required for observing and recording data is allocated to the observers by their supervisors.

• The infection liaison nurses inform others about the results of observation as agreed in the unit. The observation is open and confidential in nature and silence relating to individual performance is the ethical principle guiding the observation.

• Informing patients/clients and their next of kin is particularly important. Depending on the situation, information may be given by the infection liaison nurse or the personnel being observed. The most important thing is to ensure that the patients/clients and their next of kin are aware that observation is focused on the behaviour of the staff, the aim of observation is to develop practices and no data relating to them is collected.

Informing patients/clients and their next of kin is particularly important.
Feedback and reporting

• The infection liaison nurses produce feedback as agreed in the unit and organization.

• When revealing the results of observation it is beneficial to note the number of observations and remember the fact that a small data set does not allow making strong conclusions.

• Frequent observation produces cumulative data relating to the hand hygiene practices, meaning that combining data from several observation periods gives more data for conclusions.

• The results may be introduced as statistics or in graphic. Optimally, the feedback should be given in a form that reveals change in hand hygiene practices.

• The feedback is often given in meetings for all staff members (all professional groups) in the unit, ensuring comprehensive access to the results.

• The infection liaison nurses collect data on forms, which makes it easy to report and utilize for annual reporting and action plans.

• In the report the mean and range of the length of disinfection is introduced. In addition, percentage proportions of sufficient length of disinfection (≥ 30 sec) are reported. The data should be introduced by different professional groups and by unit.

• Emphasizing good performance in hand hygiene practices as revealed by observations strengthens good practices, helping them become normal behaviour.

Monitoring change

• The infection liaison nurses produce information about changes in hand hygiene implementation for supervisors and the person in charge of the organization’s Infection control unit. The information may be presented in different forms, such as tables and graphs.

• Supervisors organize the development of operations in the areas needed in collaboration with the infection liaison nurses. This calls for responding to findings on a regular basis. In addition, time must be allocated for planning corrective measures and informing staff about them.

Infection liaison nurses produce information for supervisors.
## IMPLEMENTATION PLAN

### Education

- The key factor driving the adoption of the KhYHKÄ operational model is a desire to ensure staff members’ hand hygiene competence. Education may be arranged on organization level, or in work units if there are special features in the unit that must be taken into account in addition to good general hand hygiene. Within the organization, the Infection Control Unit has the best and most up-to-date information relating to infection control.

- Hand hygiene is easily seen as a familiar issue, which is why taking part in training is not always seen as important. That is why the launching of the implementation of the operational model, and thus of hand hygiene improvement, may be promoted by making hand hygiene training sessions mandatory for all staff groups.

### Evaluation of adoption

- Evaluation of the adoption of the KhYHKÄ model includes collecting feedback data on staff members’ experiences on being observed, as well as infection liaison nurses’ experiences of observing their colleagues. This allows supervisors to obtain information about any development needs related to information or the actual observation process, as well as factors that may hinder good hand hygiene in the work unit.

- Feedback may be collected in discussions with supervisors and departmental staff meetings. The most important thing is that supervisors react speedily to any negative experiences related to the observation process or hand hygiene, or factors preventing the observation.

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The Infection Control Unit has the best and most up-to-date information.

The most important thing is that supervisors react speedily to experiences being observed.
Development

Operation based on the results obtained

• The short time changes caused by the operational model are expected in the manifestation of changes in the hand hygiene practices and consumption of the hand disinfectant. Long-term changes are manifested as changes in prevalence of HAIs.
• When developing operation, commonly used quality management methods such as workshops, projects and teams are utilized. When planning development measures, delegating decision-making to as near practical work level as possible is key. This is the level best qualified to solve problems that hinder good hand hygiene practices. The role of supervisors and organization leaders is to allocate resources for development work, monitor activity and strengthen it.

Delegating decision-making to as near practical work level as possible is key.
Evaluation

Evaluation of the effects and impact of khyhkä

• The aim of evaluation is to generate information about the effectiveness and impacts of a uniform operational model on strengthening the prerequisites of safe patient care through evidence-based, effective and efficient hand hygiene practices. The information obtained will be used in developing hand hygiene, the operational model and evidence-based practice in the hospital.

• The study also provides information on factors which promote or hinder good hand hygiene at organization and unit level.

• Evaluation of the impacts and effectiveness of the KhYHKÅ operational model can be done from various perspectives and using different methods. The methods used in evaluation of the hand hygiene process, impacts and patient outcomes as well economic impacts are collected in Table 2. The input of various experts working within the organization may be used in evaluating the effects and impact of the operational model; another alternative is to commission university students at different levels to study the phenomenon as part of their theses.

Table 2.
The approaches of evaluation the impacts and effectiveness of the KhYHKÅ operational model.

<table>
<thead>
<tr>
<th>STRUCTURES: Structural factors which enable hand hygiene practices in the unit</th>
<th>PROCESS: Impacts of the intervention on changes in hand hygiene practices.</th>
<th>OUTCOMES AND IMPACTS: Effectiveness on patient care outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The experiences of different stakeholders relating to promotion and hindering factors in the unit.</td>
<td>4. Change in hand hygiene practices and consumption of alcohol-based disinfectant</td>
<td>5. Prevalence of HAIs</td>
</tr>
<tr>
<td>2. The experiences of different stakeholders relating to utility of the operational model.</td>
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<td>6. Costs of HAIs (organization and social costs)</td>
</tr>
<tr>
<td>3. Patients’ evaluation about hand hygiene practices in their own care.</td>
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</tbody>
</table>

Nursing Research Foundation | Operational model: Hand hygiene practice evaluation and development | 18
References

Observer training programme

Evaluation of hand hygiene practices

Target group
Work unit infection liaisons, others with comparable infection prevention competence, or other designated members of staff within the organization.

Duration
6 hours

Contents
1. Significance of hand hygiene
2. Recommendations regarding good hand hygiene
3. Evaluation of hand hygiene practices
4. Observation in monitoring hand hygiene practices
   a. observation as a method
   b. ethical issues regarding observation in social and health care
   c. reliability of observation
5. The observation form and practice in how to use it
6. Data recording and reporting
7. Utilizing monitoring data in improving hand hygiene

Attached material
Spread of infections in a hospital
https://www.youtube.com/watch?feature=player_embedded&v=2PuRQZEL1oU
Observation form (App. 2).
Instructions for observations (App 3).
Instructions for informing persons who are observed (App 4).
# APPENDIX 2 OBSERVATION SHEET

## Observation sheet

How many seconds was spent on hand disinfection? (s)

Please indicate staff group in the observation. For example, N33 means that a nurse spent 33 seconds on hand disinfection.

<table>
<thead>
<tr>
<th>1. Before patient contact</th>
<th>2. After patient contact</th>
<th>3. Before clean or aseptic procedure (e.g. giving IV-medication)*</th>
<th>4. After undressing the gloves</th>
<th>5. After touching the patient’s surroundings</th>
<th>6. Do the person being observed used (Yes/No)</th>
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<tbody>
<tr>
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<td></td>
<td>Rings</td>
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* If the person being observed used gloves, the duration of hand disinfection is observed before dressing the gloves.

On the criterion 6: Ny (= Nurse YES) means that the nurse being observed had a ring, wristwatch or inappropriate nails.
**APPENDIX 3. INSTRUCTIONS FOR OBSERVATION**

Instructions for observation

**Informing the observees**
Before beginning the observation, make sure your observees are aware of the focus of observation (hand hygiene practices).

**Recording observations**
- observations are recorded on a paper form and then transferred into electronic format
- make a note of occupation in conjunction with duration so that the findings can be assessed by occupation.
- E.g. D 33 means a doctor/physician who disinfects her/his hands 33 seconds, T 25 means a therapist who disinfects her/his hands 25 seconds

N = nursing staff
D = doctor/physician
T = therapist
F = physiotherapist

- **Duration-related findings (criteria 1-5) are recorded as:**
  - Length of hand disinfection in seconds
  - If hands were not disinfected, duration is marked as 0 seconds.
  - Criteria 1 - 5: observations can be made by row or by column, depending on what feels suitable. E.g. hand disinfection of the same person before and after contact with a patient OR the actions of several different people, first before contact with a patient, and then after contact with a patient, again with different people.

- **Use of hand jewellery (criterion 6)**
  - observation incidence of wristwatch, rings, inappropriate nails focusing on the same person as:
    - Yes /No
  - question 6: go through all three subsections at one time.

**Observing duration**
- duration is recorded from the moment when disinfectant is applied to hands to the moment when hand-rubbing ends
- measuring the duration of disinfection is aided by a stopwatch attached to a base (do not use a wristwatch or similar). The stopwatch is allowed to run for the entire duration of the observation period, requiring the observer only to glance at the watch hands at the start and end of the timing period. This also causes less disruption for the observee.
- in case the phenomenon under observation does not take place (e.g. hands were not disinfected prior to contact with a patient), duration is marked on the form as 0 seconds.

**Who is being observed?**
- observations are made of several different persons; the same person may also be observed several times
APPENDIX 4 INFORMING STAFF

Informing staff, instructions for observers

When should informing take place?
The observation is conducted openly, which is why observees must be informed about it. The informing is done in three stages:

a) general informing, e.g. during ward meetings, about the onset of regular hand hygiene practice monitoring in the unit,

b) general informing on the day the observation takes place, and
c) to the observee, e.g. “is it alright if I observe your hand hygiene practices while you...?”

• This ensures that everyone under observation is aware of when he or she is being observed and of the type of information being gathered. When informing observees, stating “I’m observing hand hygiene practices” is sufficient information, with no need to explain the contents of the observation form in more detail (as this might affect the conduct of the observee).

The purpose of observation
• The organization is committed to following practices that ensure patient safety, including good hand hygiene. The purpose of observation is to produce information regarding hand hygiene practices and to help improve them. Observation is included in the duties comprising the observer’s area of responsibility.

What type of information is gathered?
• During observation, information is only gathered about hand hygiene practices. The observation is anonymous and confidential. No information apart from occupation recorded about the observees is gathered. The findings are presented in a manner rendering it impossible to identify any individual person at any stage.

How are the results reported?
• The findings are reported on a regular basis in a previously agreed manner. Informing is the responsibility of infection liaisons in collaboration with immediate superiors of the units. The findings can be used in writing articles and as material for academic theses. Use of the findings is always agreed on according to the practices of the organization.

In what type of situations does observation take place?
• Observation focuses on hand hygiene practices in typical nursing-related procedures. In situations that are sensitive for the patient or particularly challenging for the member of staff (such as resuscitation), observation should only take place if there is an exceptionally weighty reason for doing so.

Informing patients and their next of kin
• Patients and their next of kin should always be informed when the observer is in the same space with them. The informer can be anyone present in the situation; the observer makes sure that the information has been given. Patients and their next of kin are informed that no information regarding them will be gathered, and that the observation focuses on the actions of the personnel and is meant to improve practices in the unit.
Example 1.

1. Hand hygiene is always a part of individual procedures and other activities.
2. Practices should be looked at as a whole, not as isolated tasks.
   • Good hand hygiene is an integral part of nursing procedures, such as cannulation.
   • The figure shows how hand hygiene is implemented at different stages of the procedure and the areas it impacts.

Areas of Impact:

- **Patient safety**
  - Hand disinfection
    - Getting ready
  - Hand disinfection
    - Aseptic procedure: Insertion of IV cannula
  - Hand disinfection
- **Work safety**

APPENDIX 5. AN EXAMPLE OF HAND HYGIENE IMPLEMENTATION
APPENDIX 6. CASE: IMPLEMENTATION OF HAND HYGIENE IN IV CANNULA INSERTION

IV cannula insertion

Was hand disinfection adequate?

• have all the equipment you need at hand
• open packages without touching the contents
• apply cuff
• clean the skin

Was hand disinfection adequate?

• put on protective gloves
• insert and secure the cannula

Take off protective gloves

Was hand disinfection adequate?

NO

Increased patient safety risk

NO

Increased patient safety risk

NO

Increased work safety risk

YES

Patient and work safety in IV cannula insertion