Mapping and assessing clinical handover training interventions

Mapping and Assessing Clinical Handover Training Interventions

Slavi Stoyanov, PhD[1], Henny Boshuizen, PhD[2], Oliver Groene, PhD[3], Marcel van der Klink, PhD[4], Wendy Kicken, PhD[5], Hendrik Drachsler, PhD[6], Paul Barach, MD, MPH[7,8,9]

[1]Research Fellow at Centre for Learning Sciences and Technologies, Open University of the Netherlands
[2]Professor of Learning Sciences at Centre for Learning Sciences and Technologies, Open University of the Netherlands
[3]Lecturer in Health Services Research Faculty of Public Health and Policy, London School of Hygiene & Tropical Medicine, United Kingdom
[4]Associate professor at Centre for Learning Sciences and Technologies, Open University of the Netherlands
[5]Assistant professor at Centre for Learning Sciences and Technologies, Open University of the Netherlands
[6]Assistant professor at Centre for Learning Sciences and Technologies, Open University of the Netherlands
[7]Professor (adjunct), University of Stavanger, Norway; [8]Senior Research Fellow, Utrecht Medical Centre, The Netherlands;[9]University College Cork, Ireland

Correspondence to:
Dr. Stoyanov
Centre for Learning Sciences and Technologies
Open University of the Netherlands
PO Box 2960, 6401 AT, Heerlen, The Netherlands
Telephone: (+31) 45-576- 2893; fax: (+31) 45-576-2907
Email: slavi.stoyanov@ou.nl

Keywords: Group concept mapping; Handover; Training; Patient safety; Education

Word count: 4800

Abstract

Background: The literature reveals a patchwork of knowledge about the effectiveness of handover and transfer of care training interventions, their influence on handover practices, and on patient outcomes. We identified a range of training interventions, defined their content, and then proposed practical measures for improving the training effectiveness of handover practices.

Methods: We applied the Group Concept Mapping approach to identify objectively the shared understanding of a group of experts about patient handover training interventions. We collected 105 declarative statements about handover training interventions from an exhaustive literature review and from structured expert interviews. The statements were then given to 21 healthcare and training design specialists to sort the statements on similarity in meaning, and rate them on their importance and feasibility.

Results: We used multidimensional scaling and hierarchical cluster analysis to depict the following seven clusters related to various handover training issues: standardisation, communication, coordination of activities, clinical microsystem care, transfer and impact, training methods, and work-place learning.

Conclusions: Ideas on handover training interventions, grouped in thematic clusters, and prioritised on importance and feasibility creates a repository of approaches. This allows health care institutions to design and test concrete solutions for improving formal training and work-place learning related to handovers, and addressing informal social learning at the organisational level, with the aim of increasing impact on handover practice and patient outcomes. Measures need to be taken to assure a continuum of handover training interventions from formal training through work-place learning through less formal social learning, and to embed this training in the design of the clinical microsystem.

BACKGROUND

When a patient's transition from the hospital to home is less than optimal, the repercussions can be far-reaching – hospital readmission, adverse medical events, and even mortality. A number of factors have been found to contribute to ineffective handover processes including (a) lack of formal policies and standard handover protocols regarding health provider communications;[1-2] (b) a decrease in the time devoted to teaching and oversight in the work place due to an increase in service workload;[3] and, (c) attitudes and organisational culture, such as lack of responsibility to cross-cover patients, and, a pervasive "culture of blame"[3-4]. Education and training in handover are considered effective means to address these issues[5]. However, research to assess the impact of educational interventions on patient outcomes is still limited and fragmented [4,6-7]. There is no agreement on what constitute the core content areas to address and are the instructional methods to apply in formal handover training.

Formal training is a systematic, planned, instructor-led learning approach to healthcare professionals, typically conducted in specific places and times and leading to some form of recognition (diplomas or certificates) on successful completion of pre-defined learning objectives[8-9]. Although the literature discusses mainly formal training for improving handovers, it is useful to check for informal training interventions including those shaped by the hidden curriculum[10]. In addition, little is known about the transfer of handover training knowledge and skills to the bedside or the impact of handover training on actual clinical practice or patient outcomes[11]. These limitations might explain, despite years of effort to improve hospital to community patient discharges, the limited impact on reducing hospital readmissions, [12]

The study addresses the following research questions: (1) What are training interventions for improving handover; (2) What are the most important core topics and the

training methods for handover formal training; and, (3) How can we increase the transfer, uptake and impact of training on handover practices and patient outcomes?

METHODS

Setting and Sample

This study was undertaken as part of the European Handover Research Consortium as part of the European Commission 7th Framework sponsored project "Improving the Continuity of Patient Care through Identification and Implementation of Novel Handoff process in Europe (the HANDOVER Project)". The study was conducted between January and July 2011. The sample consisted of 30 project members invited through electronic mail to participate in the study. The project members had prior knowledge about and experience in patient handover as indicated by a survey conducted within the framework of the study[13]. Subjects were informed about the purpose, the procedure, and the time needed for completing the activities. The group was introduced to the Group Concept Mapping approach, applied to the study, during two of the project meetings. In a later stage we invited ten external experts (healthcare specialists with experience in handover) recommended by Handover project members. These professionals received the same information about the approach and intent of the study.

Instruments and Procedures

Group Concept Mapping (GCM) is an integrated mixed method, including both qualitative and quantitative measures. It uses a structured approach to identify an expert group's understanding about the types, methods and characteristics of handover training interventions[14-16]. Multivariate statistical techniques of multi-dimensional scaling and hierarchical cluster analysis translate complex qualitative data into conceptual maps. A group concept map shows all the specific ideas about a particular topic (e.g., handover educational interventions). The map also indicates how ideas are related to other ideas. In addition, the

map indicates how much emphasis should be placed on a particular idea or cluster relative to other ideas (e.g., how relatively important or feasible to implement a given intervention is vis a vis other proposed approaches).

Idea generation

A literature search was performed on a number of databases in both the medical and educational domains, in English, such as Academic Search Elite, Business Source Premier, PsyINFO, Web of Science and Pubmed. The search resulted in 128 papers that were selected for further exploration. They were divided into four parts and each of the four researchers (WK, MvdK, HB and SS) were tasked to independently look at one part, extract ideas about handover training interventions and formulate them as statements.

The statements typically were short phrases expressing an idea, and, where appropriate, incorporate an active verb to give a sense of action and direction[17]. Examples of statements include: “Look for a standard approach to handover communication”; “Adopt methods already used in other domains (i.e., Crew Resource Management, I-SBAR, Five Ps, I-PASS-THE-BATON); and “Apply job aids”.

The literature search generated 252 statements. After removal of duplicative and vague statements, the final list included 75 unique statements in the sample. We added 26 statements to this list from the structured interviews that were conducted with 35 healthcare training specialists from EU nations. Examples of statements from the interview analysis were as follows: “Use active methods such as case studies and role playing”; “Train providers about attitudes for common responsibility of patients”; “Shift attention from one doctor-one patient relationships to cross-cover patient commitments”; and, “Calculate the adverse events to measure the training effects”.

Details about the search strategy for literature review, the interview procedure and the questions in the interview script are presented in Appendix A.

Sorting

The 101 resulting statements were mailed to the 30 participants in the original European Handover Research Consortium (see full list under Acknowledgments). We asked participants to evaluate whether the statements covered the domain of handover educational interventions and to add new statements as needed. Four new statements were generated from this step. The final 105 statements were sent to 15 HANDOVER project members (out of 30) and six external participants (out of 10) who agreed to participate. We asked the 21 experts to first sort the statements into clusters that made conceptual sense and then assign to each cluster a label that described its contents.

Rating

The expert group was instructed to rate each statement using a Likert scale of 1 to 5. The two rating questions were:

- How important was the statement (1 = not important, 5 = extremely important).
- How feasible was it to implement these ideas in practice (1 = not feasible, 5 = most feasible).

A web-based platform for sorting and rating based on Concept System Global platform was created to make the process more efficient[13]. The survey also collected information about the educational background, professional experience and prior knowledge of the participants about handover practices and research.

Participant characteristics

Forty participants were invited, of whom 21 (15 Handover Project's members and six external experts), accepted the invitation to participate and complete both the statement sorting and rating activities. Fourteen (66.7%) of the sample were healthcare professionals and seven (33.3%) were instructional designers, specialists in designing training in different professional domains but without educational background in medicine. Ten of the

participants (47.6%) had more than 10 years of professional experience. Five professionals (23.8%) reported between 6 to 10 years of experience. Six specialists (28.6%) declared 1 to 5 years of professional experience.

The study received ethics approval by the ethical review board of the University Medical Centre, Utrecht, the Netherlands. The experts were consented before participating. To preserve participant anonymity, the files exported from Concept System Global to Concept System Core for further analyses[18] contained only numeric data and no personal identifying information.

Data analysis

We applied multidimensional scaling (MDS) and generated a concept map depicting graphical representations of relationships among the 105 statements. Using the MDS solution, a hierarchical cluster analysis grouped the statements into conceptual clusters, based on similarity of ideas. Descriptive and non-parametric statistics were applied for the rating of data.

RESULTS

We first describe the concept mapping study characteristics of our respondents and then divide the results into the two major stages of data analysis: sorting and rating.

Map construction

Figure 1 represents the first output of the GCM analysis – a point map, which is combined with the cluster map and the labelled map.

*** INSERT FIGURE 1 ABOUT HERE***

Each point on the map represents one of the 105 original statements. The closer the statements are to each other the closer in meaning they were perceived to be by the experts who performed the sorting. To make the map more informative we used hierarchical cluster analysis (HCA), which increased the reliability of depicting thematic areas on the point map.

We used the practical heuristics '20-to-5', to find the optimal number of clusters, which is based on the rule that most of the other GCM projects identify clusters in the range between five and 20[14-15]. We started from a 20-cluster solution with the goal of arriving at a five-cluster solution. At each iteration, we assessed whether the merging of clusters made sense. An additional criterion used was a routine multidimensional statistic called a bridging value. The analysis computes a bridging value (between 0 and 1) for each statement on the map. A bridging value closer to 0 means that a statement was grouped together with others close, while a value closer to 1 indicates that the statement was sorted "with some statements somewhat distant on one side of the same and some statements on the other side, and the algorithm located it in an intermediate position"[15, p 101]. A cluster is also assigned a mean bridging value, calculated on the basis of the bridging values of the statements in this cluster. The lower the bridging value the more coherent a cluster is, meaning that more people agree on the content. The process to define the optimal number of clusters using this approach produced a seven-cluster solution as the best representation of the data (Figure 1).

The size of each cluster does not reflect the importance or strength of a cluster. Clusters represent distinct conceptual areas that participants identified as key issues of handover training interventions. The statements within each cluster therefore 'co-sort' statistically and conceptually. The closer the clusters are to each other the closer they are conceptually.

There are three methods to define clusters thematically and the best solution is to combine all three methods. The first method looks at the statements that constitute a particular cluster; the second checks the bridging values for the statements in a cluster; and the third considers the suggestions that emerge from the Concept System Core software[18] for the best fitting labels of the clusters (as defined by participants). The following seven clusters were identified: *standardisation, communication, coordination of activities, clinical microsystem, transfer and impact, training methods, and work-place learning.* Appendix B

presents all clusters with statements included and the bridging values for both statements and clusters. The values of statements on importance and feasibility are also included.

The resulting map objectively represents the group's common understanding of issues related to handover training interventions. The focus of the sorting analysis is on this common understanding and shared vision rather than on differences between subsets of the samples shown by different maps. Clusters help identify distinctive themes, but they do not "rate" the ideas, e.g., compare clusters with high rated statements to clusters containing low rated ideas[15,19].

Importance and feasibility of handover educational interventions

Exploring the rating data provided useful information for interpreting the results as well. Clusters that scored high on importance received lower scores on feasibility, and vice versa. The exception was *Standardisation*, which scored high on both dimensions. The highest score on importance was attributed to the clusters *Clinical Microsystem* (M = 3.89; SD = 0.3), *Standardisation* (M = 3.88; SD = 0.2), and *Transfer/Impact* (M = 3.81; SD = 0.3). The other clusters, *Communication* (M = 3.61; SD = 0.3), *Coordination* (M = 3.60; SD =0.4), *Training Methods* (M = 3.57; SD = 0.5) and *Work-place learning* (M = 3.58; SD = 0.5) received a somewhat lower score. A Kruskal-Wallis test revealed no significant differences between the clusters on importance ($\chi^2 = 9.332$; df = 6; $p > .05$).

The feasibility rating figures show a different configuration. *Standardisation* received the highest score (M = 3.89; SD = 0.2), and *Communication* (M = 3.63; SD = 0.3), *Coordination* (M = 3.60; SD = 0.4), and *Training Methods* (M = 3.69; SD = 0.4) also received a high score, while *Work-place learning* (M = 3.32; SD = 0.4) and particularly *Transfer/Impact* (M = 3.16; SD = 0.4) and *Clinical Microsystem* (M = 3.12; SD = 0.6)

received much lower scores. A Kruskal-Wallis test indicates a significant difference between the clusters on the feasibility dimension ($\chi^2 = 32.279$; df = 6; $p < .001$).

We applied a detailed Mann-Whitney U post hoc test to pinpoint where the differences reside, and also used the Bonferroni correction for multiple comparisons, to adjust the critical alpha value and prevent a type I error. The test reveals that a significance difference existed between *Standardisation* and *Clinical Microsystem* ($p < .001$; $r = -.72$); *Standardisation and Transfer/Impact* ($p < .001$; $r = -.67$); *Standardisation* and *Work-place learning* ($p < .001$; $r = -.69$); *Communication* and *Transfer/Impact* ($p < .005$; $r = -58$); *Clinical Microsystem* and *Training Methods* ($p < .05$; $r = -.48$); and *Training Methods* and *Transfer/Impact* ($p < .001$; $r = -.54$). The analyses indicate a large effect size for all tests that indicated significance of the findings.

The analysis also depicted a significant difference between the values of importance and feasibility in two clusters: *Clinical Microsystem* [Mean Rank $_{importance}$ = 20.43; Mean Rank $_{feasibility}$ = 8.57; $\chi^2 = 14.560$; df = 1; $p < .001$] and *Transfer/Impact* [Mean Rank $_{importance}$ = 26.66; Mean Rank $_{feasibility}$ = 12.34; $\chi^2 = 15.817$; df = 1; $p < .001$]. Analyzing interventions for their relative importance and feasibility seems to be useful, but it might not be sufficiently sensitive in terms of specifying which interventions for adoption a statement suggests. To explore the relationships between statements on importance and feasibility within a particular cluster further, we used the average of each statement of both values to plot a bivariate graph. The graphic is divided into four quadrants above and below a mean value of each rating variable within a cluster. Group Concept Mapping methodology calls this graphic a Go-Zone, because it suggests actions and identifies possible implementation challenges. An example of a go-zone is presented in Figure 2.

INSERT FIGURE 2 ABOUT HERE

Typically, statements in the upper-right quadrant are the most ‘actionable‘ and high priority ideas in short term as they score above the mean on both variables (e.g., statement “29. Relate handover training to real-life situations”). The lower-right quadrant, statements with higher importance and lower feasibility indicates interventions are score high on priority but may be challenging from an implementation perspective. The upper-left and the lower-left quadrants contain ideas with a lower priority. Appendix C presents all the cluster go-zones. Appendix D lists all statements that score above the means of both importance and feasibility (all statements from all clusters in the upper-right quadrant).

Most statements that score high on both values come from the clusters that represent formal handover training interventions, including Training Method – 10 , Standardisation – 8, Communication – 4, and Coordination – 4. The cluster Clinical Microsystem is represented by five statements; Work-Place Learning and Transfer/Impact by two. Ideas that are important but difficult to implement represent mostly the clusters Clinical Microsystem (issues with regard to changing attitudes and culture) and Impact (challenges with measuring impact of handover training interventions).

A cluster could contain statements with relatively higher or lower rating on importance and feasibility.

Differences with regard to professional groups and experience

The analysis of the professional occupation and past experience of the raters revealed no significant differences between the ratings of healthcare professionals versus those of training experts ($\chi^2_{importance} = .669$; df =1; $p > .05$; $\chi^2_{feasibility} = 1.397$; df = 1; $p > .05$), nor was there a difference in ratings based on experience (‘more than 10 years’, ‘between 6 to10 years’ and ‘between 1 to 5 years’; $\chi^2_{importance} = .013$; df = 2; $p > .05$; $\chi^2_{feasibility} = .881$; $p > .05$). This suggests all participants in this study were a homogeneous group with a high degree of agreement on the valuation of different statements and clusters.

DISCUSSION

The discussion is organised around the three research questions: (a) What are training interventions for improving handover; (b) What are core topics and training methods for handover formal training; and, (c) How can we increase the transfer, uptake and impact, of training on handover practices and patient outcomes?

What are training interventions for improving handover?

The concept mapping study identified three types of handover training interventions: formal training in handover, work-place learning and clinical microsystem based interventions. The clusters *Standardisation*, *Communication*, *Coordination* and *Training Methods* are identified as separate clusters but since they cluster close together, we feel they fall into a more global category consistent with a concept of "formal training" (*'zone' of formal training in handover)*. *Standardisation*, *Communication* and *Coordination* are about *what* to teach, *Teaching Methods* are about *how* to teach. While the literature discusses formal training in handover as the only training intervention, this study identified two other training interventions: work-place learning and interventions related to redesigning the clinical microsystem.

The cluster work-place learning suggests that learning needs to be integrated in professional practice. Work-place learning does not need to be formal or entail organised training events, but must be guided by explicit learning goals to be achieved and that can be measured. Job-aids, handover electronic performance systems, supervision and guided practice on a one-to-one basis, discussion of cases, and workplace observation were recommended by participants. Future research should determine what are the most effective approaches to ensure sustainable workplace learning.

At first glance it may seem that redesigning the clinical microsystem has little to do with implementing handover training interventions. A more careful examination suggests that

the statements in this cluster outline the contours of a "handover community of practice." 'Communities of practice' is a term associated with training, but it is also considered an integral part of the work of professionals and their professional formation[10]. A community of practice is a different learning model than formal training and work-place learning. It is social, informal and integrated into the professional practice and organisational culture. Community of practice requires a group of professionals not necessarily bounded to a particular department. ("Involve different professions, such as doctors, nurses and allied professions, in order to reflect the complexity of real life handovers"). Learning is embedded in shared professional practice and occurs in real-life contexts. A community of practice develops a repertoire of sharing resources to support learning on the work places ("Provide support of handover practices on work places"; " Apply job aids (to-do lists, help about content and format of handover procedure, check lists) to support handover in work environments"; "Use existing information systems for an effective handover practice"; "Adopt methods of high-performance teams"). The best way to acquire particular handover attitudes is by socialization through immersion into the culture of a community of practice ("Create appropriate attitudes, climate and role models"; " Shift attention from one doctor-one patient relationships to cross-cover patient commitments and transfer of professional responsibility"; " Effective handover requires changing mentality of [the] professionals involved").

Regarding the lower ratings of feasibility for the cluster Microsystems, it is not realistic to expect that training alone can change a clinical microsystem, although it can contribute to change and help establish more effective handover practice and culture that supports social and informal learning.

The high feasibility scores of all clusters defining formal training suggests that the participants in this study consider formal training as the easiest handover educational intervention to organise.

What are the most important core topics and the training methods for handover formal training?

The concept mapping study identified at least three important handover training themes to address: standardisation of practice, communication, and coordination of activities. The results are in line with the findings of Cheah et al,[1] Laugaland et al,[5] and Shojania et al,[7]. Although the literature discussed standardisation of practices as part of communication, the current study underscores the importance to consider standardisation as a separate topic.

The statements in the cluster *Training Methods* refer to different instructional design approaches needed (Problem-Based Learning,[20-21] Four Components Instructional Design Model - 4C/ID Model,[22-23] Cognitive Apprenticeship Approach,[24-25] Theory of Deliberate Practice,[26] and Cognitive Flexibility Theory[27]. They also suggest considering combinations of these methods according to the first principles of instructional design[28]. The statements in the clusters *Standardisation*, *Communication*, *Coordination* and *Training Methods* present a rich repository of ideas for selecting content and instructional methods when designing formal training in handover. The statements can be considered building blocks that can be combined in different ways to design customized training that reflect specific goals and contexts. Defining which of these combinations are most effective is a subject for future research.

How to increase the transfer, uptake and impact, of training on handover practices and patient outcomes?

This study identified a separate cluster that indicates issues with the transfer of formal training knowledge and skills to the workplace and the impact of formal training on real handover practices. The fact that these two issues are included in one cluster suggests that they are interdependent. Stated another way, if there is no transfer of training, there cannot be an impact.

The distances between each of the clusters that compose formal training zone (*Standardisation*, *Communication*, *Coordination* and *Training Methods)* and the cluster *Transfer/Impact* is relatively large, which suggests that the participants in this study do not associate formal training with transfer of knowledge, skills and attitudes, and they do not believe that formal training would automatically impact handover practice. This result is in accordance with the findings of other studies and needs to be addressed in any future intervention[11,29-31]. Making the transfer of handover knowledge and skills more effective, which eventually might generate an impact on the flow and process of the clinical microsystem, requires measures to be taken for providing effective support to clinicians in their work places. More research is needed on what these measures could be and how best to enable them to support training interventions.

Although *formal training*, *clinical microsystem* and *transfer/impact* are not directly related, an indirect link between them exists through the bridging role of *Work-place learning*. The *Work-place learning* scores on feasibility were lower than the formal training clusters but higher than the *Clinical Microsystem* and *Transfer/Impact*. The importance of work place learning for transfer of knowledge, skills and attitudes, and the impact it has on handover practices is supported by other research[32].

Our study has several limitations. The sample included a limited number of participants, was non-randomly selected, and had an unequal representation of health professions occupations. The sample of 21 participants should be judged in comparison to the

typical Group Concept Mapping practice which allows a smaller number of people to sort and rate statements[14-15]. In addition, our statements came from 128 scientific papers on handovers, supplemented with the data from 35 interviews. We checked the sorting analysis using the responses of 10, 12, 15, 17 and 21 participants at different stages of the study, and we found no substantial differences between the group sizes suggesting a valid and reliable process. There seems to be a point of saturation in the number of participants, after which no substantial benefit is accrued and no substantive changes occur in the results. These findings were confirmed by a recent meta-analytical study on 69 group concept mapping projects conducted over the last 10 years, which found that 20 to 30 sorters produce the optimal goodness-of-fit between the aggregated similarity matrix and its representation as a conceptual map[33].This observation is also in line with results from research in other domains[34].

Conclusions

One of the main conclusions and contributions of this study is agreement on the benefits of a continuum of handover training, ranging from formal training to work-place learning to participation in a community of practice related to handovers and to considering the training context offered by the clinical microsystem is one of the main conclusions of this study.

We believe that the results of our study will contribute to the development of more effective design of handover training interventions. A combination of various research approaches, and a larger sample of training experts and clinicians, could provide valuable perspectives and further insights into the theory and practice of educational interventions to improve patient handovers.

Our study was exploratory. It is aimed at providing empirical ground for formulating hypotheses, not for testing hypotheses. Individual statements grouped in clusters are a rich

source of information for researchers and practitioners to look at, select and combine ideas to design and test handover training interventions in different contexts, and at different levels. One particular idea that comes out of this study which we want to further elaborate and empirically test, is a training approach that combines principles of different instructional methods (Problem-Based Learning, Cognitive Apprenticeship, Four Components Instructional design, and Cognitive Flexibility Approach). Another idea worth investigating is the effect of electronic handover performance support systems on increasing performance in the work place.

This is not the first time Group Concept Mapping is used in the healthcare domain. We emphasize in our analysis the powerful feature of GCM method to produce a common understanding (conceptual map) of a group of experts to help drive reflection in action in improving clinical care in general, and in this study on handover training interventions. Healthcare projects are increasingly applying this approach, not only for research but also for informing decision making and planning of clinical interventions[35].

REFERENCES

1 Cheah LP, Pollard J, Watters DAK. Electronic medical handover: towards safer medical care. *Med J Aust* 2005;**7**:369-373.

2 Iedema R, Merrick ET, Kerridge R , et al. Handover-enabling learning in communication for safety (HELiCS): a report on achievements at two hospital sites. *Med J Aust* 2009;**11**:133-136.

3 Barach P, Philibert I. The July Effect: Fertile Ground For Systems Improvement. *Ann. Intern. Med* 2011;155:5:331-332;PMID 21747094.

4 Arora VM, Johnson JK, Meltzer DO et al. A theoretical framework and competency-based approach to improving handoffs. *Qual Saf Health Care* 2008;**17**:11-14.

5 Laugaland, K A, Aase K, Barach P. Interventions to improve patient safety in transitional care – A review of the evidence. *Work* 2012;**4**: 2915-2924.

6 Johnson J, Barach P. Patient care handovers: what it will take to ensure quality and safety during times of transition. *Med J Aust* 2009;**11**:110-112.

7 Shojania KG, Fletcher KE, Sanjay S. Graduate medical education and patient safety: A busy and occasionally hazardous intersection. *Ann. Intern*. Med 2006;**8**:592-598.

8 Milano M, Ullius D. Designing powerful training. San Francisco, CA: Jossey-Bass Pfeiffer 1998.

9 Rothwell, WJ, Kazanas HC. Human resource development. A strategic approach. Amherst, MA: HRD Press 1994.

10 Etienne W**.** Communities of practice: Learning, meaning, and identity. Cambridge: Cambridge University Press 1998.

11 Phillips JJ. How much is the training worth? *Training and Dev* 1996;**4**:20-24.

12 Levinson, D. Hospital incident reporting system do not capture most patient harm. Department of Health and Human Services, Office of Inspector General. January 2012. OEI-06-09-00091. Accessed 6th of August 2012. http://oig.hhs.gov/oei/reports/oei-06-09-00091.asp

13 Concept Systems Global [Computer Software]. Concept Systems, Inc. Ithaca, N.Y; 2011.

14 Trochim W. An introduction to concept mapping for planning and evaluation. *Eval. Program Plann* 1989;**12**:1–16.

15 Kane M, Trochim W. Concept mapping for planning and evaluation. Thousand Oaks, CA: Sage Publishing 2007.

16 Stoyanov S, Hoogveld B, Kirschner PA. Mapping major changes to education and training in 2025. *JRC Technical Note European Communities Institute for Prospective Technological Studies* 2010: **JRC59079**:2-52.

17 Eden C, Ackermann F. Making strategy. The journey of strategic management. London, UK: Sage Publications 2002.

18 Concept System Core [Computer Software]. Concept Systems, Inc. Ithaca, N.Y; 2011.

19 Bartholomew DJ, Steele F, Moustaki I et al. The analysis and interpretation of multivariate data for social scientists. London, UK: Chapman & Hall/CRC 2002.

20 Dolmans DHJM, Wolfhagen IHAP, Van der Vleuten CPM, et al. Solving Problems with group work in problem- based learning: hold on to the philosophy. *Med. Educ* 2001; **5**: 84-89.

21 Hmelo-Silver C E. Problem-based learning: What and how do students learn? *Educ. Psychol. Rev* 2004;**3**:235–266.

22 Van Merriënboer J J G. Training complex cognitive skills: A four-component instructional design model for technical training. Englewood Cliffs, NJ: Educational Technology Publications 1997.

23 Van Merriënboer J J G, Kirschner P A. Ten steps to complex learning. Mahwah, NJ: Erlbaum/Taylor and Francis 2007.

24 Brown J, Collins A, Duguid P. Situated cognition and the culture of learning. In: McLellen H, ed. Situated Learning Perspectives. Englewood Cliffs, NJ: Educational Technology Publications 1996:19-44.

25 Brown JS, Duguid P. The social life of information. Boston, MA: Harvard Business School 2000.

26 Ericsson KA. The influence of experience and deliberate practice on the development of superior expert performance. In: Ericsson, K.A, Charnes N, Feltovich PJ, Hoffman RR, eds. The Cambridge Handbook of Expertise and Expert Performance. New York, NY: Cambridge University Press 2006:683–703.

27 Spiro RJ, Jehng J. Cognitive flexibility and hypertext: theory and technology for the non-linear and multidimensional traversal of complex subject matter. In: Nix D, Spiro R eds. Cognition, Education and Multimedia. Hillsdale, N.J: Erlbaum 1990: 163–205.

28 Merrill, D. First principles of instruction. *Educ. Technol. Res. Dev* 2002;**50**:43–59.

29 Kirkpatrick D L, Kirkpatrick JD. Evaluating training programs (3rd ed.). San Francisco, CA: Berrett-Koehler Publishers 2006.

30 Chiabura D S, Marinova SV. What predicts skill transfer? An exploratory study of goal orientation, training self-efficacy and organizational supports. *International Journal of Training and Development* (IJTD) 2005;**9**:110-123.

31 Gaudine A, Saks AM. A longitudinal quasi-experiment on the effects of post training transfer intentions. *Human Resource Devel*. Quart 2004;**15**:57-76.

32 Raybould B. Building performance centered web-based systems, information systems, and knowledge management systems in the 21st century. In: Rossett, A, ed. The ASTD E-Learning Handbook. Best Practices, Strategies, and Case Studies for an Emerging Field. New York, NY: McGraw-Hill 2002:338–353.

33 Rosas S.R., Kane, M. Quality and rigor of the concept mapping methodology: A pooled study analysis. *Eval. Program Plann* 2012;**35**:36-245.

34 Turner C W**,** Lewis J R, Nielsen J**.** Determining usability test sample size. In: Karwowski W, ed**.** International Encyclopedia of Ergonomics and Human Factors**.** Boca Raton, FL: CRC Press 2006:3084-3088.

35 Concept mapping methodology biography and recent publications. Examples of concept mapping projects. Concept System incorporated 2012. http://www.conceptsystems.com/files/all/bibliography_examples_of_cm_projects_5.pdf (accessed 9th of September, 2012)

Acknowledgements. We thank all the members of the European HANDOVER Research Collaborative for their participation in this study. Loes Pijnenborg, Julie Johnson, Beryl Göbel, Cor Kalkman, Richard Lilford, Nicola Novielli, Yen-Fu Chen, Semira Manaseki-Holland, Basia Kutryba, Halina Kutaj-Wasikowska, Ewa Dudzik-Urbaniak, Marcin Kalinowski, Francesco Venneri, Giulio Toccafondi, Antonio Molisso, Sara Albolino, Hub Wollersheim, Gijs Hesselink, Lisette Schoonhoven, Myrra Vernooij, Marieke Zegers, Helen Hansagi, Mariann Olsson, Susanne Bergenbrant, Maria Flink, Gunnar Ohlen, Carola Orrego, Rosa Sunol, Jerry Andriessen

Competing interest statement

All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

Contributorship Statement

Slavi Stoyanov: substantial contributions to conception and design, acquisition of data, analysis and interpretation of data; drafting the article (all sections), revising it critically; and final approval of the version to be published.

Henny Boshuizen: substantial contributions to design, acquisition of data and interpretation of data; revising the article critically; and final approval of the version to be published.

Oliver Groene: substantial contributions to acquisition of data and interpretation of data; revising the article critically; and final approval of the version to be published.

Marcel van der Klink: substantial contributions to acquisition of data and interpretation of data; drafting the article (sections Background, Methods and Discussion); and final approval of the version to be published.

Wendy Kicken: substantial contributions to acquisition of data and interpretation of data; drafting the article (sections Background, Methods and Discussion); and final approval of the version to be published.

Hendrik Drachsler: substantial contributions to acquisition of data and interpretation of data; drafting the article (sections Background, Methods and Results); and final approval of the version to be published.

Paul Barach: substantial contributions to design, acquisition of data and interpretation of data; revising the article critically; and final approval of the version to be published.

Funding/Support. The study was supported by a grant from the European Union, the 7th Framework Programme of the European Commission (FP7-HEALTH-F2-2008-223409). The study sponsor had no role in the study design, collection, analysis, interpretation of the data, or any other contribution.

Figure legends

Figure 1. Combined point cluster map of patient handover educational interventions

Figure 2. Position of statements in a cluster determined by their rating values

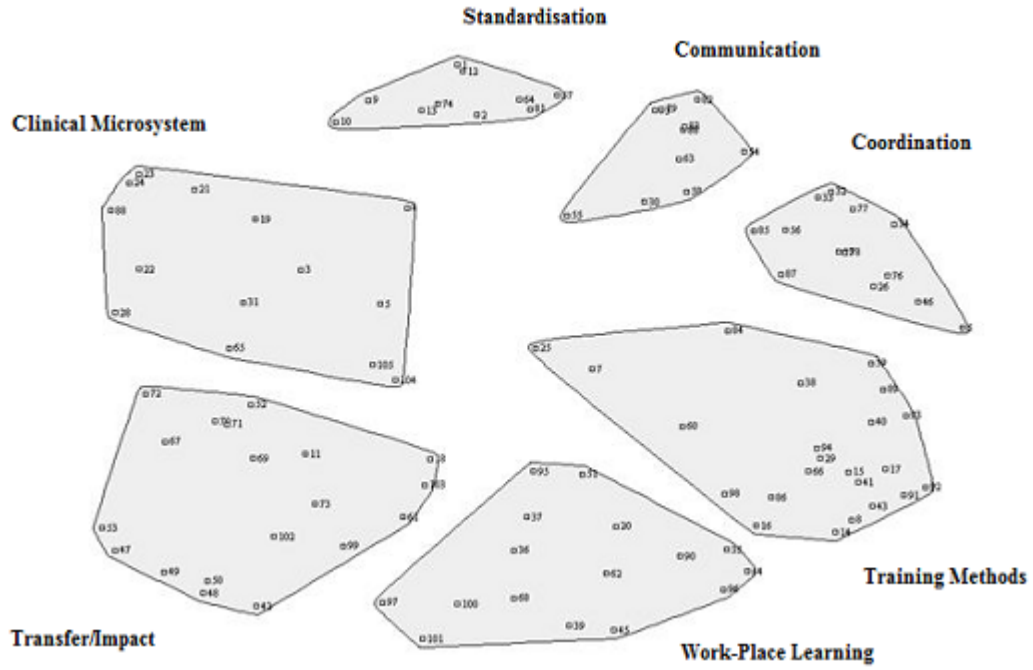


Figure 1. Combined point cluster map of patient handover educational interventions

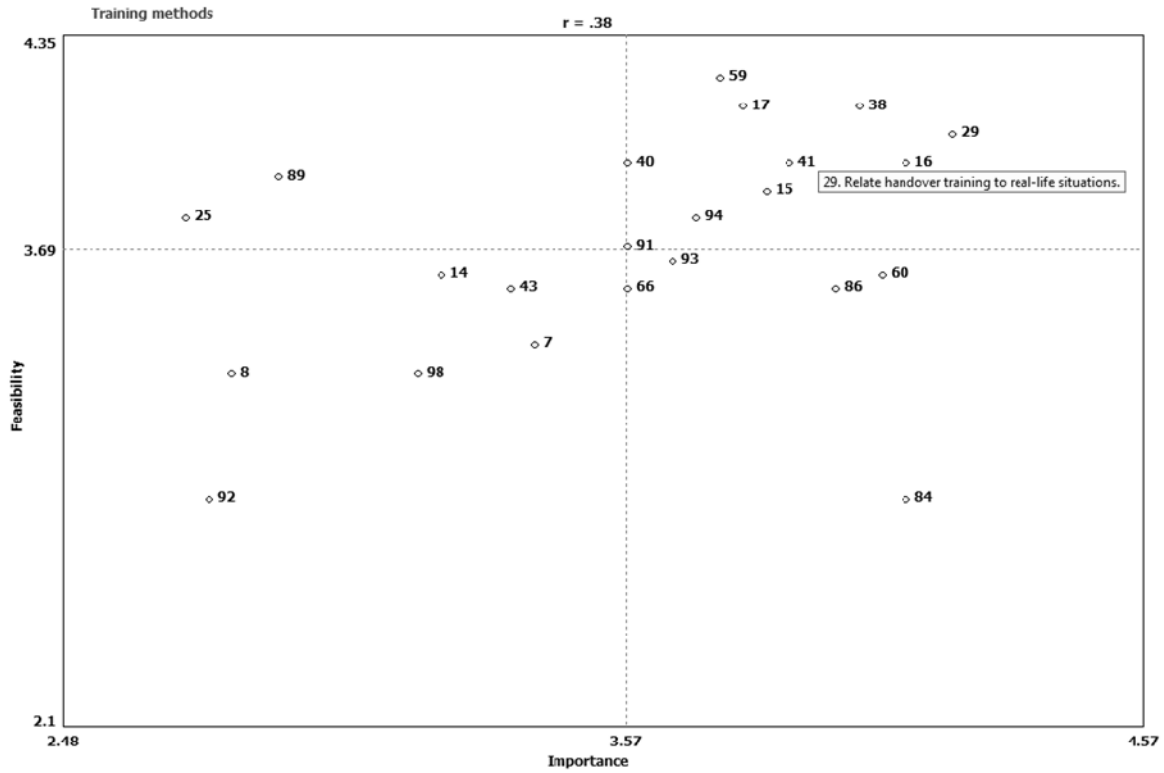


Figure 2. Position of statements in a cluster determined by their rating values

Appendix A. Literature review search strategy, interview procedure and interview script

Search strategy for literature review.
The search strategy consisted of three steps. Our initial search included a combination of terms such as 'handoff', 'handover', 'transition of care', 'transfer of care', and 'discharge', with 'training', 'education', 'learning', 'instructional design', 'competence development', and 'performance management'. As this initial search resulted in a small number of sources, we extended our search for publications about training, learning and education in communication. As a next step in the search on handover training interventions we included research on effectiveness of different training approach in medical domain, not necessary directly related to handover (e.g. problem-based learning, cognitive apprenticeship approach, and performance support systems).

Interview procedure
The interview guide outlines the questions that were posed to the participants and describes the procedure for conducting the interviews (see below for the interview script). Apart form some background questions, the participants were asked to reflect on issues related to content and design of handover training. The verbatim notes of the transcribed recording of interviews were translated into English. Two researchers divided the task between themselves and analysed independently the data applying Grounded Theory Approach (Strauss A, Corbin J. Grounded Theory Methodology - An Overview. In: Denzin N K, Lincoln, Y. S eds. Handbook of Qualitative Research. Thousand Oaks CA: Sage Publications 1994: 273-285) supported by open source software (Fenton A. Weft QDA. [Open Source Computer Software. V. 2.0] http://www.pressure.to/qda/; 2006).
The coding was a subject of mutual/double checking to ensure that nothing was omitted and there were not duplicative statements.

For coding the text, the researchers used statements, not single concepts or key words (Eden C, Ackermann F. Making strategy. The journey of strategic management. London, UK: Sage Publications 2002). Firstly, statements are more meaningful expressions than key words alone and they are the format needed for Group Concept Mapping (GCM). Secondly, in GCM, more general categories are determined through a quantitative aggregation of the participants' grouping of the statements. The researchers did not need to construct these generic themes themselves and to negotiate intercoder reliability.

Some of the statements in the final list, most of them came from interviews, were not directly related to handover training interventions but reflected measures for improving handover practices at the organisational design level. We purposely left these ideas in the final list expecting that the eventual grouping of training design and organisational design statements may suggest innovative ideas. We believe that the approach paid off as we were able to identify the idea of handover communities of practice in the cluster clinical microsystem.

Questions in the Interview script

1) Where are you currently working (name of the institution + country)? What is your profession and could your describe your tasks, *especially* those related to training?

2) How many years of experience do you have with training and what kind of experience do you have? For example, coordinating, implementing, organizing, conducting training…

3) How many years of experience do you have with training in handover? By training in handover I mean to train care providers to handover a patient from primary care or the patient's home to the hospital and back from the hospital to primary care or the patient's home.

4) What kind of experience do you have in training *in handover*? For example, coordinating, implementing, organizing, conducting training…

5) Regarding the content of the training, how do I decide what to train? How should I determine the content of the training on, for example, handover?

6) From your experience, what aspects of the handover process should be trained during a training on handover? For example, communication rules, team work, tool use….

7) Regarding the group composition of the participants of the training, would you advise mono disciplinary groups or mixed, multidisciplinary groups? For example, training nurses and doctors separately, or training them together in the same group. Why?

8) What would you advise regarding the duration of the training? How many hours or days should the training take? For example, should it be a maximum of 2 hours, of is it better to spend at least 4 hours, or even a day or a couple of days…..

9) What would you advise regarding the training format? What works best for the medical staff. For example, should there be lectures, demonstrations, role play, simulations, training on the job…?

10) Regarding the meetings, what type of meetings should be organised? For example, face-to-face in small groups, face-to-face with lectures (large group), e-learning/self-study (no face-to-face meetings).

11) What would you advise regarding assignments? Should there be assignments before and/or during and/or after training? And what kind of assignments should be given?

12) What would you advise regarding follow-up sessions? Is it advisable to organize for example a follow-up session in which is discussed if the participants have used what they learned during training in their jobs. What are the advantages/disadvantages?

13) Would you advise to formally examine whether participants are able to correctly apply what was trained? What are the pros and the cons to formally examine participants?

14) Should participants receive a certificate?

15) What arguments should be used to stress the importance of the training?

16) How should the staff be motivated to participate in training?

17) Should participation in training be obligatory or should it be voluntary? Why?

18) What is the most appropriate way to evaluate the training? For example, should there be a formal evaluation, using a questionnaire or should it be a more informal evaluation by shortly discussing the training at the end of the training session..

19) What is a good way to measure the training *effects* on the actually handover process in daily work? For example to measure whether less adverse events have occurred, or whether more relevant information has been handed over.

20) What conditions should be met to enable the staff to put into practice what they learned during training?

21) Do you have any suggestions for how conditions could be improved in order to enable staff to apply what is learned. For example, purchase electronic devices for handover such as PDAs (Personal Digital Assistant), make the new handover protocol mandatory.

22) Do you have any comments that could be meaningful regarding a training in handover. Or do you have any questions or anything else you want to share?

Appendix B. Statements in clusters with their bridging values (BV) and scores on importance (I) and feasibility (F)

	Cluster 1: Standardisation	BV	I	F
12	Apply a standardized handover protocol.	.00	4.19	4.35
1	Look for a standard approach to handover communication.	.01	3.90	3.90
57	Training content contributes to standardization of the handover process.	.13	3.67	4.05
64	Provide guidelines pertaining to effective implementation of communication models.	.15	3.76	3.90
81	When standardizing the handover, take into account both the content and the process.	.21	3.71	3.95
13	Handover protocols should account for the variability in either institutional or national cultures.	.33	4.05	3.50
74	Handover training needs standardisation of handover content and process in terms of organisational structure, culture, climate, policy and leadership.	.33	3.90	3.75
2	Adopt methods already used in other domains (Crew Resource Management, I-SBAR, Five Ps, I-PASS-THE-BATON).	.36	3.48	4.15
9	Apply evidence-based handover guidelines.	.41	4.05	3.70
10	More effective are the handover guidelines that are integrated into the process of decision making.	.53	4.10	3.65
	Count: 10 **Std. Dev.:**	**.17**	**.21**	**.24**
	Average:	**.25**	**3.88**	**3.89**

	Cluster 2: Communication	BV	I	F
79	Provide information on the principles of effective communication that should be presented in a standardised handover process.	.18	3.62	4.05
82	Develop a handover communication model that best fits participants' handover situation, based on both principles of effective communication, existing communication models and guidelines for effective implementation of communication models.	.26	3.81	3.35
58	Training emphasizes the team-oriented nature of handover.	.28	3.90	3.90
75	Handover communication works best if it captures problems, hypotheses, and intent, rather than simply lists what occurred.	.28	3.76	3.80
80	Participants develop a handover communication model based on principles of effective communication.	.28	3.86	3.50
54	Training content not restricted to the behaviour (faults and mistakes) of individuals but also to faulty systems.	.29	4.00	3.50
83	Better understanding the rationale behind the communication model means: you are inclined to use the model	.29	3.33	3.20
30	Provide information for handover process and people involved.	.33	3.29	4.05
63	Take away the naive and erroneous theories participant hold on how effective communication works.	.33	2.95	3.40
55	Training pays attention to the different roles of different parties and the underlying authority structures.	.34	3.62	3.55
	Count: 10 **Std. Dev.:**	**.04**	**.31**	**.28**
	Average:	**.29**	**3.61**	**3.63**

	Cluster 3: Coordination	BV	I	F
32	Train communication and coordination of activities.	.16	3.86	3.70
33	Train teamwork.	.25	4.24	3.65
77	Train participant to analyse existing communication models in order to be able to decide which model or aspects of a model are most relevant for their handover situation.	.25	3.48	3.90
56	Training focuses on strengthening the integration of knowledge, skills and attitudes.	.26	3.95	3.75
87	Help training participants to cope with the psychological impact of handover errors.	.28	3.14	3.10
85	Focus of the training is not only on skills (e.g., learning to use a standard), but also on knowledge (e.g., knowledge of mental models, rules for effective communication), and on attitudes (e.g., attitude towards responsibility during handover).	.29	3.81	3.85
27	Handover is part of training on communication.	.30	3.62	3.85
34	Train attitudes for professional responsibility.	.30	4.05	2.90
26	Handover is part of training on continuation of care.	.33	3.67	4.05
78	Familiarise participants with the concept of mental models.	.34	2.90	3.45
76	Process mapping is used to train participants in becoming more conscious of what kind of information should always be handed over.	.38	3.57	4.00
46	Train attitudes for common responsibility for patients.	.40	3.76	2.85
6	Teach handover providers to tell a 'better story'.	.46	2.71	3.80
	Count: 13 **Std. Dev.:**	**.07**	**.43**	**.38**
	Average:	**.31**	**3.60**	**3.60**

	Cluster 4: Clinical microsystem	BV	I	F
104	Involve different professions, such as doctors, nurses and allied professions, in order to reflect the complexity of real life handovers.	.27	3.86	3.50
105	Involve doctors and nurses from both primary and secondary care, in order to reflect the complexity of real life handovers.	.31	3.95	3.30
5	Create appropriate attitudes, climate and role models.	.52	4.19	2.90
65	Provide support of handover practices on work places.	.58	4.19	3.65
24	Use electronic handovers.	.61	3.76	3.35
28	No effect of handover training without changing the system.	.63	3.43	2.40
21	Redesign clinical system.	.64	3.67	2.10
3	Shift attention from one doctor-one patient relationships to cross-cover patient commitments and transfer of professional responsibility.	.65	3.90	3.00
23	Use existing information systems for an effective handover practice.	.65	3.33	3.45
4	Adopt methods of high-performance teams.	.68	3.86	3.65
31	Effective handover requires changing mentality of professionals involved.	.69	4.10	2.20
19	Apply job aids (to-do lists, help about content and format of handover procedure, check lists) to support handover in work environments.	.77	4.00	3.75
22	High reliable clinical systems require high variability of human behaviour to adapt flexibly to the constantly changing circumstances.	.89	4.05	2.70
88	Electronic handovers forms need to be perceived by the users as simple, informative, easy of use, time-saving and practical.	1.00	4.10	3.70
	Count: 14 **Std. Dev.:**	**.19**	**.25**	**.55**
	Average:	**.64**	**3.89**	**3.12**

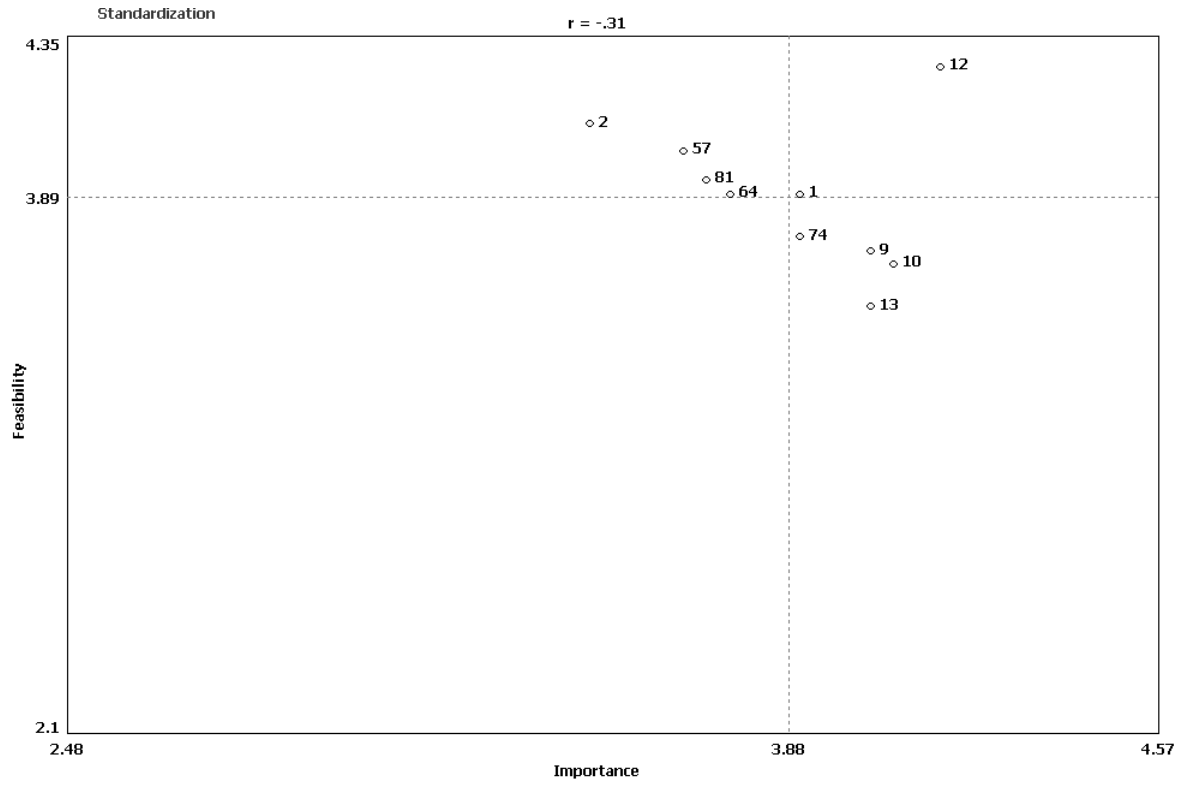
	Cluster 5: Transfer/Impact	BV	I	F
61	Managers and co-workers of the training participants are informed about the why and what of the training to assure a favourable work climate.	.29	3.71	3.80
18	Handover activities should be supported in work environments.	.31	4.57	3.40
73	Initiatives to increase the transfer to the workplace in close collaboration with prospective participants, their supervisors and other relevant stakeholders.	.31	3.81	3.00
69	Strong alignment with those who have organizational authority for making key decisions and with managers and supervisors of the prospective participants of the training and other learning events.	.32	3.67	3.05
52	Build alliances with stakeholders to assure the training is linked to the organizational needs.	.38	3.90	3.15
99	Transfer will only happen when training participants perceive opportunities to apply what they have learned in their jobs.	.38	4.19	3.20
103	Provide facilitating environment that supports professionals in designing own solutions to better meet their own preferences and handover situation.	.44	3.67	3.20
53	Measure the long-term impact of the training.	.46	3.95	2.45
71	Involvement of all relevant stakeholders, including prospective training participants, in the training need analysis to assure high quality data and sound interpretations.	.48	3.76	3.15
11	The impact of formal training on improving environmental characteristics is relatively limited when compared to the effect of the support integrated in work environment and the redesign of clinical systems.	.51	4.10	2.95
48	Look at the number of rejected referrals and missed diagnoses to measure training effect.	.52	3.71	2.90
49	Look at the number of readmission to measure training effect.	.52	3.71	2.95
102	Training is a valuable intervention to increase participants' knowledge and skills, but it is not sufficient to assure long-term impact on participants' behaviours.	.54	3.71	3.10
47	Calculate adverse events to measure training effect.	.55	3.71	2.50
42	Evaluate transfer of skills.	.67	3.90	3.05
50	Use satisfaction survey for measuring training effect.	.69	3.10	4.25
72	Workplaces are assessed on how these promote or interfere with the training.	.69	3.57	2.90
70	In-depth analyses of the needs to gain insights into the problems, their causes, and possible solutions.	.85	3.76	3.35
67	Take into account the following rule: 'Learning Experience x Work Environment = Results'.	.88	3.81	3.75
	Count: 19 **Std. Dev.:**	**.17**	**.28**	**.41**
	Average:	**.52**	**3.81**	**3.16**

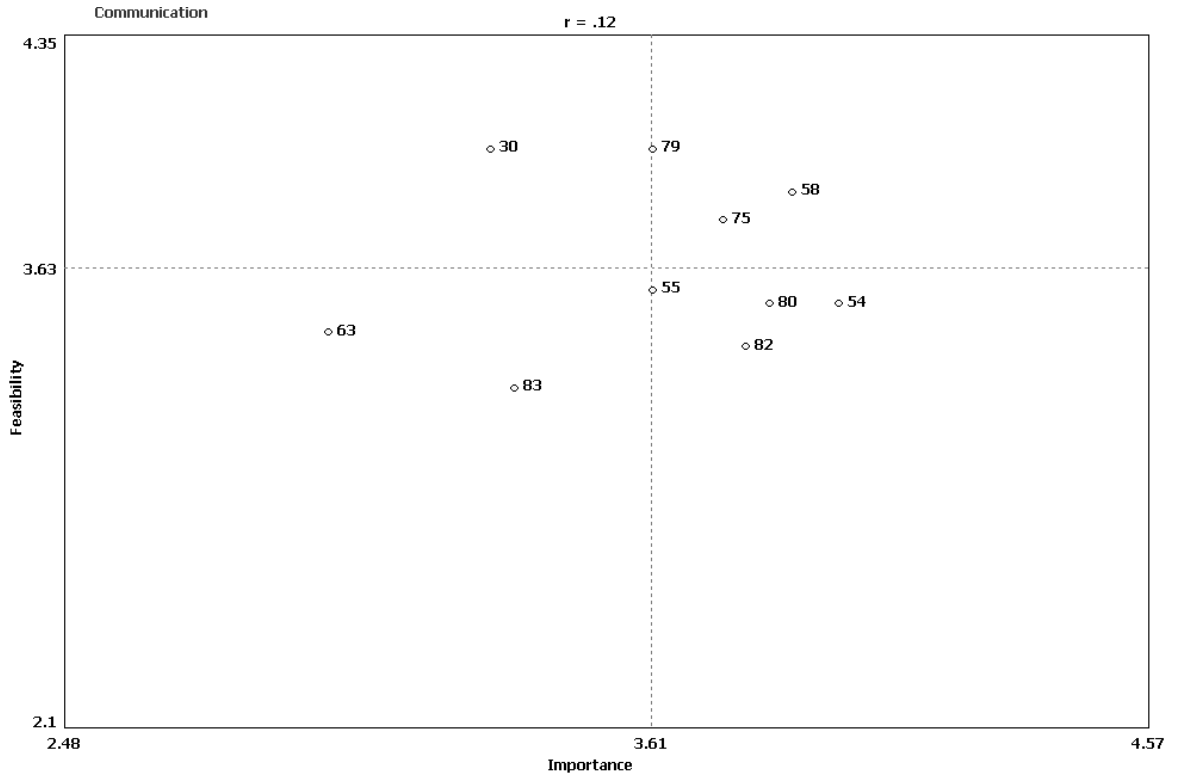
	Cluster 6: Training methods	BV	I	F
17	Use various cases and examples to provide multiple perspectives to the problem.	.09	3.81	4.20
15	Involve learners in problem solving activities.	.10	3.86	3.90
29	Relate handover training to real-life situations.	.10	4.24	4.10
66	Training takes into account the following participant factors: prior knowledge and experiences, motivational aspects, and learning style.	.11	3.57	3.55
91	Use real-life simulations.	.11	3.57	3.70
16	Learning should be organised in an authentic environment or in a learning environment that resembles as much as possible the professional situations in which learners are expected to apply their knowledge and problem solving skills.	.14	4.14	4.00
41	Use active methods such as case studies and role playing.	.14	3.90	4.00
8	Consider the use of self-directed videotaping for reflexive learning.	.17	2.76	3.25
43	Use simulations as assignments.	.19	3.33	3.55
94	Encourage participants to envisage how they are going to use the new learned skills and knowledge in their own daily practice after the training and what obstacles they will face and how they will cope with these obstacles.	.20	3.71	3.80
89	Start with examples of high quality performance and when participants' understanding of the subject increases, introduce examples of less effective performance.	.21	2.86	3.95
86	Develop not a one-fits-all training, but a generic training which can be customized by training specialists.	.23	4.00	3.55
60	Training pays attention to the development of intentions to transfer the training content to the daily work settings.	.28	4.10	3.60
92	Use virtual reality environments.	.28	2.71	2.80
98	Large differences between instructional formats of training and learning events, and learning styles employees usually perform at work, cause obstacles for employees to accommodate their learning to the instructional format.	.28	3.14	3.25
59	Use in the training authentic examples of good and bad handovers.	.29	3.76	4.30
14	Ask learners to compare their performance with either an expert performance or peers' performance.	.30	3.19	3.60
84	The participants need to develop attitude of responsibility understanding that when a patient is handed over to them, the responsibility for this patient is also handed over to them.	.30	4.14	2.80
7	Couple inexperienced handover providers with experienced incoming and outgoing providers.	.31	3.38	3.35
38	Show the practical value of handover training.	.32	4.05	4.20
40	Stress the importance of handover training.	.32	3.57	4.00

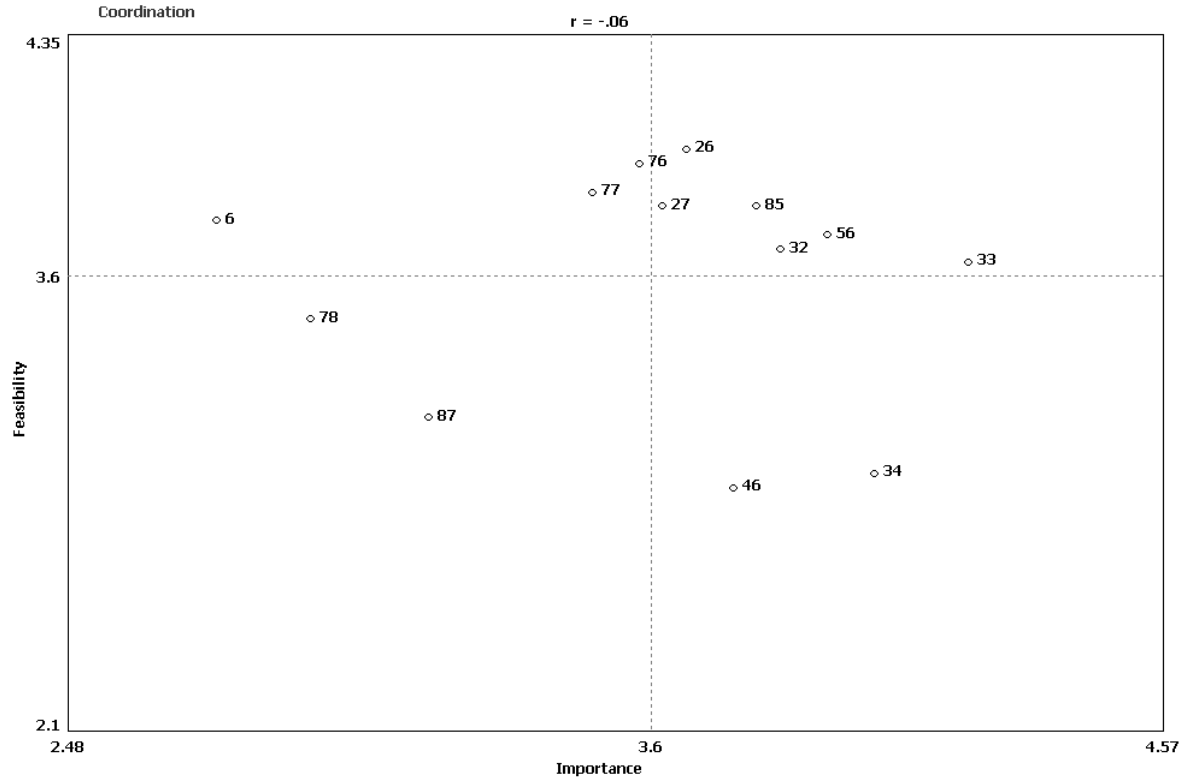
93	Offer sufficient opportunities for analysis and reflection during the training to prevent participants from developing a fixed, rigid mental model, which result in performing all handover processes in a routine-like way, neglecting the specific requirements.		.35	3.67	3.65
25	Use wikis, blogs and social networks when designing handover training.		.47	2.67	3.80
		Count: 24	**Std. Dev.:**	**.10**	**.48**	**.41**
			Average:	**.23**	**3.57**	**3.69**

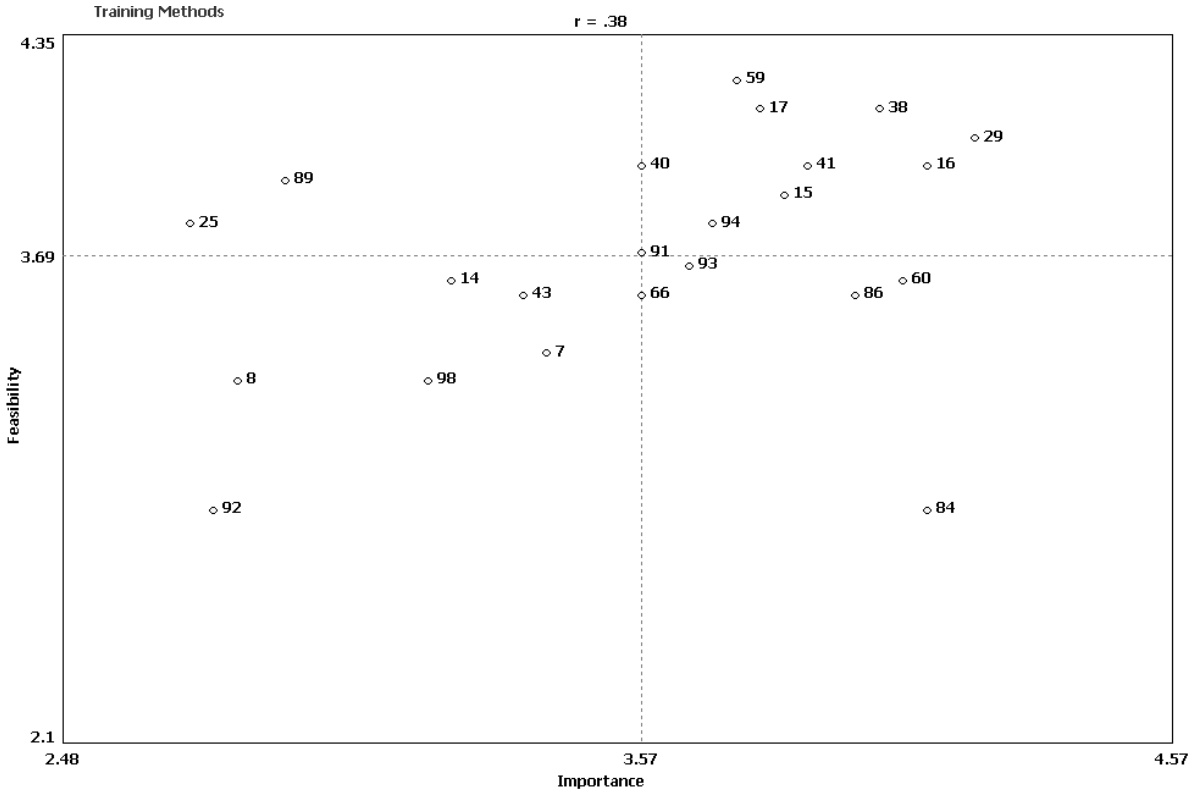
	Cluster 7: Work-place learning	BV	I	F
35	Make handover training attractive.	.26	3.95	3.45
20	Learning becomes immanent part of professional practice.	.27	4.19	2.60
51	Handover training is based on an in-depth analysis of the performance problem.	.29	3.76	3.30
90	Deliver the training (partly) as on-the-job training in the participants' daily work setting.	.29	4.05	2.95
95	Some form of guided practice and supervision on a one-to-one basis including discussion of cases and workplace observation is necessary after the training.	.31	3.90	2.95
62	Training is accompanied by other (learning) interventions in the workplace.	.32	3.90	3.30
37	Consider handover training as part of work.	.33	4.05	3.50
36	Relate handover training and professional development.	.42	3.29	3.60
96	Give participants confidence that they can succeed in the learning activity, and try to frame learning activities as opportunities rather than threats.	.44	3.29	3.60
44	Organise training follow ups for sharing and exchanging experience.	.47	3.95	3.65
45	Give a certificate in the end of the training.	.48	2.48	4.10
100	Transfer will not happen if a considerable time interval exists between the training and the opportunity to perform in the workplace.	.48	3.71	3.20
39	Compensate participants in handover training with money and time.	.50	2.57	2.80
97	Find ways to link the participants' learning outcomes to any meaningful organizational reward.	.53	3.05	3.30
101	Providing information about faults and adverse events will increase the motivation for attending the training.	.67	3.43	3.65
68	Have training for impact approach.	.75	3.71	3.15
	Count: 16 **Std. Dev.:**	**.14**	**.51**	**.37**
	Average:	**.43**	**3.58**	**3.32**

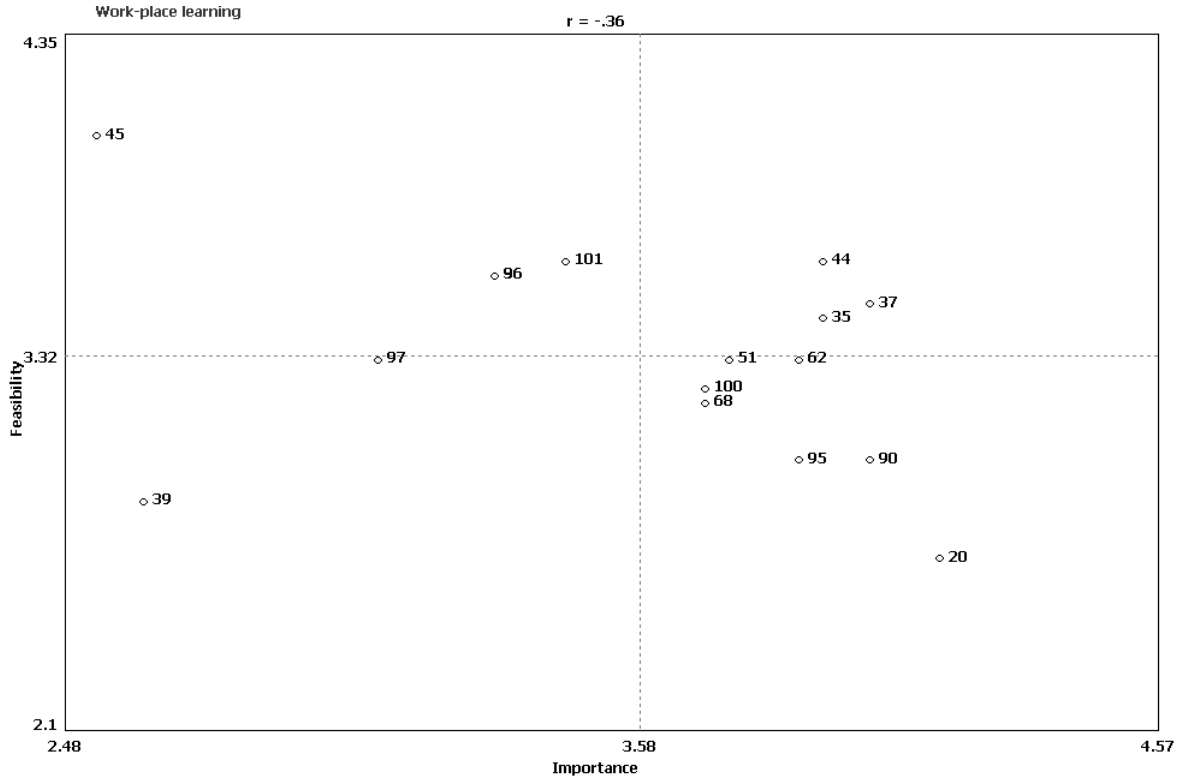
Appendix C. Position of statements in each cluster determined by their rating values ('Go-zones')

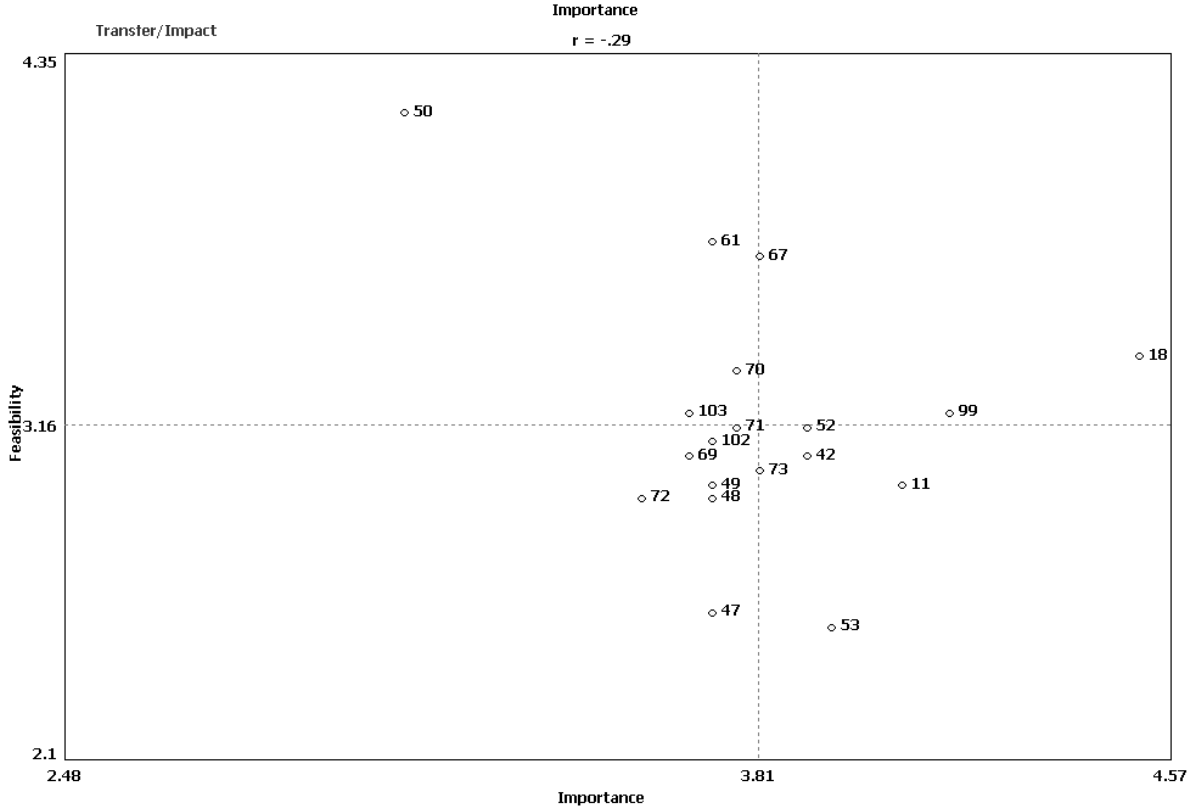


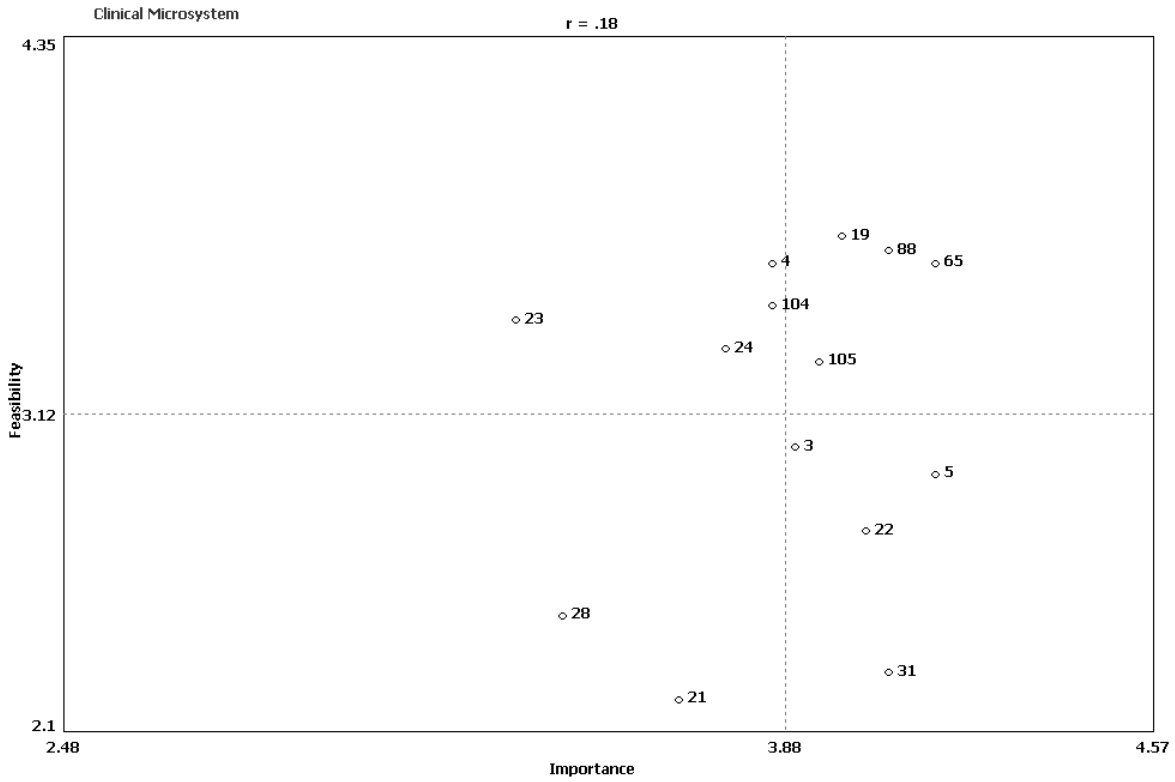



Coordination
r = -.06
4.35
3.6
2.1
Feasibility
2.48
3.6
4.57
Importance
26
76
77
27
85
6
56
32
33
78
87
34
46


Training Methods
r = .38
4.35
3.69
2.1
Feasibility
2.48
3.57
4.57
Importance
59
17
38
29
40
41
16
89
15
25
94
91
93
14
60
43
66
86
7
8
98
92
84


Work-place learning
r = -.36
4.35
3.32
2.1
Feasibility
45
101
96
44
37
35
97
51
62
100
68
95
90
39
20
2.48
3.58
4.57
Importance


Transfer/Impact
r = -.29
4.35
3.16
2.1
Feasibility
50
61
67
18
70
103
71
52
99
102
69
42
73
49
11
72
48
47
53
2.48
3.81
4.57
Importance


Clinical Microsystem
r = .18
4.35
3.12
2.1
Feasibility
2.48
3.88
4.57
Importance
19
88
65
4
104
23
24
105
3
5
22
28
31
21

Appendix D. Statements that score above the mean of importance (I) and feasibility (F)

No	Statement	Cluster	I	F
12	Apply a standardised handover protocol.	Standardization	4.19	4.35
29	Relate handover training to real-life situations.	Training methods	4.24	4.10
38	Show the practical value of handover training.	Training methods	4.05	4.20
16	Learning should be organised in an authentic environment or in a learning environment that resembles as much as possible the professional situations in which learners are expected to apply their knowledge and problem solving skills.	Training methods	4.14	4.00
59	Use in the training authentic examples of good and bad handovers.	Training methods	3.76	4.30
17	Use various cases and examples to provide multiple perspectives to the problem.	Training methods	3.81	4.20
41	Use active methods such as case studies and role playing.	Training methods	3.90	4.00
33	Train teamwork.	Coordination	4.24	3.65
65	Provide support of handover practices on work places.	Clinical microsystem	4.19	3.65
88	Electronic handovers forms need to be perceived by the users as simple, informative, easy of use, time-saving and practical.	Clinical microsystem	4.10	3.70
1	Look for a standard approach to handover communication.	Standardization	3.90	3.90
58	Training emphasizes the team-oriented nature of handover.	Communication	3.90	3.90
15	Involve learners in problem solving activities.	Training methods	3.86	3.90
10	More effective are the handover guidelines that are integrated into the process of decision making.	Standardization	4.10	3.65
9	Apply evidence-based handover guidelines.	Standardization	4.05	3.70
19	Apply job aids (to-do lists, help about content and format of handover procedure, check lists) to support handover in work environments.	Clinical microsystem	4.00	3.75
56	Training focuses on strengthening the integration of knowledge, skills and attitudes.	Coordination	3.95	3.75
60	Training pays attention to the development of intentions to transfer the training content to the daily work settings.	Training methods	4.10	3.60
85	Focus of the training is not only on skills (e.g.learning to use a standard), but also on knowledge (e.g., knowledge of mental models, rules for effective communication), and on attitudes (e.g., attitude towards responsibility during handover).	Coordination	3.81	3.85
64	Provide guidelines pertaining to effective implementation of communication models.	Standardization	3.76	3.90

No	Statement	Cluster	I	F
81	When standardizing the handover, take into account both the content and the process.	Standardization	3.71	3.95
74	Handover training needs standardisation of handover content and process in terms of organisational structure, culture, climate, policy and leadership.	Standardization	3.90	3.75
44	Organise training follow ups for sharing and exchanging experience.	Work-place learning	3.95	3.65
32	Train communication and coordination of activities.	Coordination	3.86	3.70
67	Take into account the following rule: 'Learning Experience x Work Environment = Results'.	Transfer/Impact	3.81	3.75
75	Handover communication works best if it captures problems, hypotheses, and intent, rather than simply lists what occurred.	Communication	3.76	3.80
13	Handover protocols should account for the variability in either institutional or national cultures.	Standardization	4.05	3.50
37	Consider handover training as part of work.	Work-place learning	4.05	3.50
86	Develop not a one-fits-all training, but a generic training which can be customized by training specialists.	Training methods	4.00	3.55
4	Adopt methods of high-performance teams.	Clinical microsystem	3.86	3.65
61	Managers and co-workers of the training participants are informed about the why and what of the training to assure a favourable work climate.	Transfer/Impact	3.71	3.80
94	Encourage participants to envisage how they are going to use the new learned skills and knowledge in their own daily practice after the training and what obstacles they will face and how they will cope with these obstacles.	Training methods	3.71	3.80
54	Training content not restricted to the behaviour (faults and mistakes) of individuals but also to faulty systems.	Communication	4.00	3.50
80	Participants develop a handover communication model based on principles of effective communication.	Communication	3.86	3.50
104	Involve different professions, such as doctors, nurses and allied professions, in order to reflect the complexity of real life handovers.	Clinical microsystem	3.86	3.50