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	.69	3.57	2.90

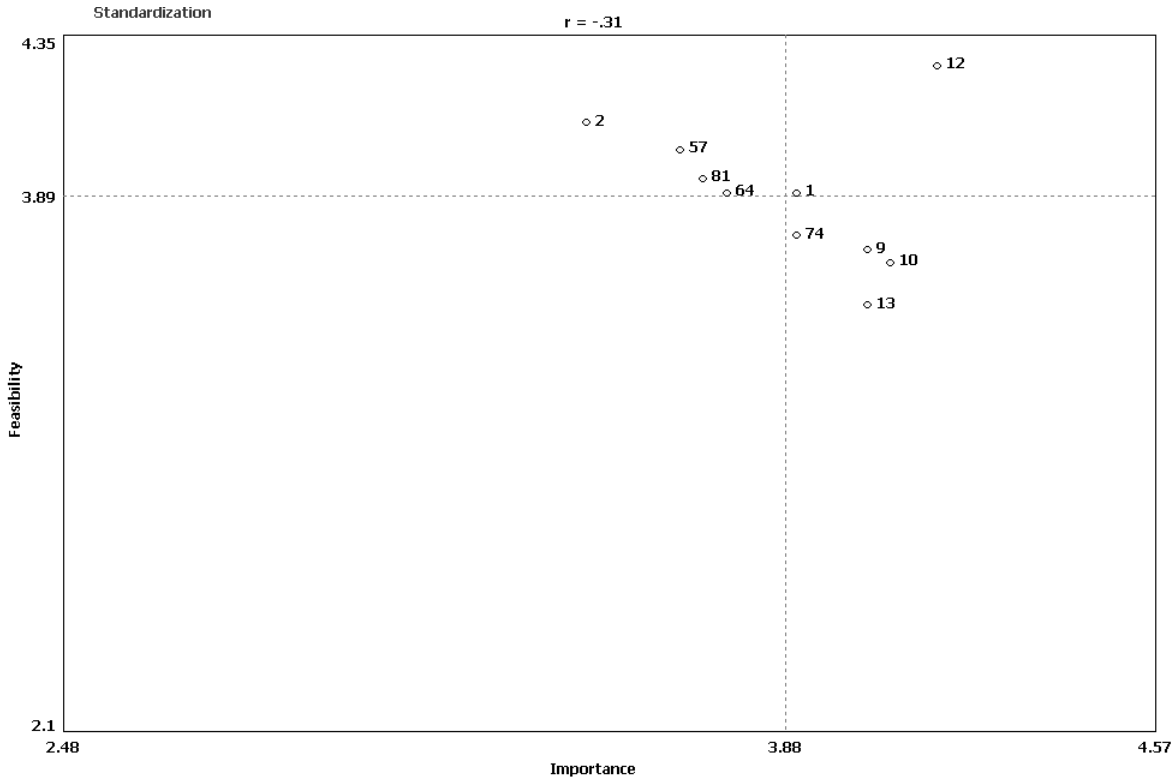
	training.				
70	In-depth analyses of the needs to gain insights into the problems, their causes, and possible solutions.		.85	3.76	3.35
67	Take into account the following rule: 'Learning Experience x Work Environment = Results'.		.88	3.81	3.75
		Count: 19	**Std. Dev.:**	**.17**	**.28**	**.41**
			Average:	**.52**	**3.81**	**3.16**

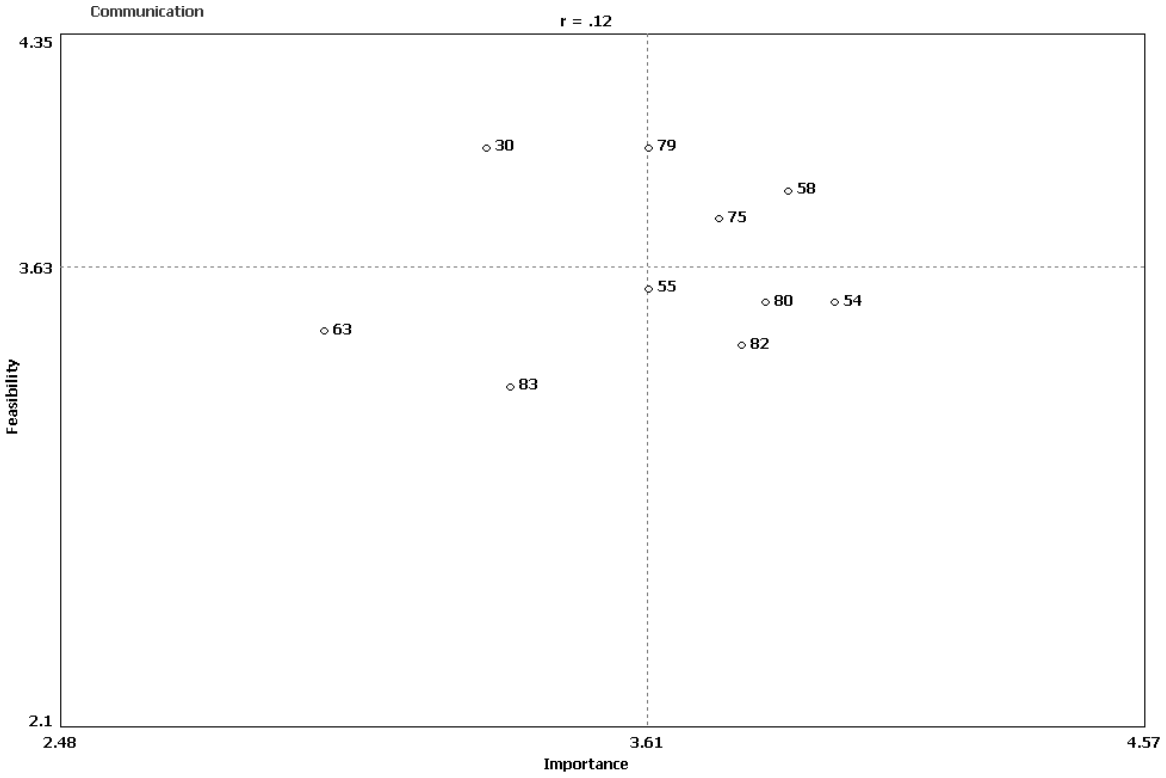
	Cluster 6: Training methods	BV	I	F
17	Use various cases and examples to provide multiple perspectives to the problem.	.09	3.81	4.20
15	Involve learners in problem solving activities.	.10	3.86	3.90
29	Relate handover training to real-life situations.	.10	4.24	4.10
66	Training takes into account the following 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

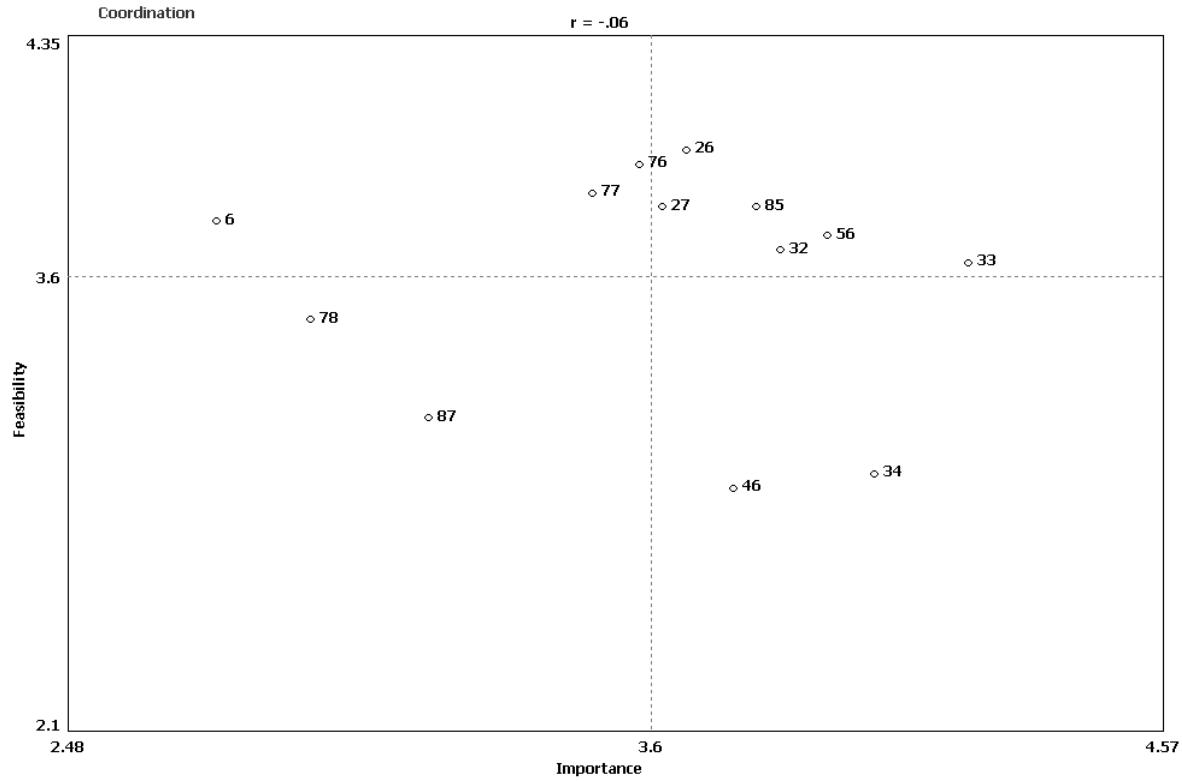
84	The participants need to develop attitude of responsibility understanding that when a patient is handed over to them, the responsibility for this patient is also handed over to them.		.30	4.14	2.80
7	Couple inexperienced handover providers with experienced incoming and outgoing providers.		.31	3.38	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**

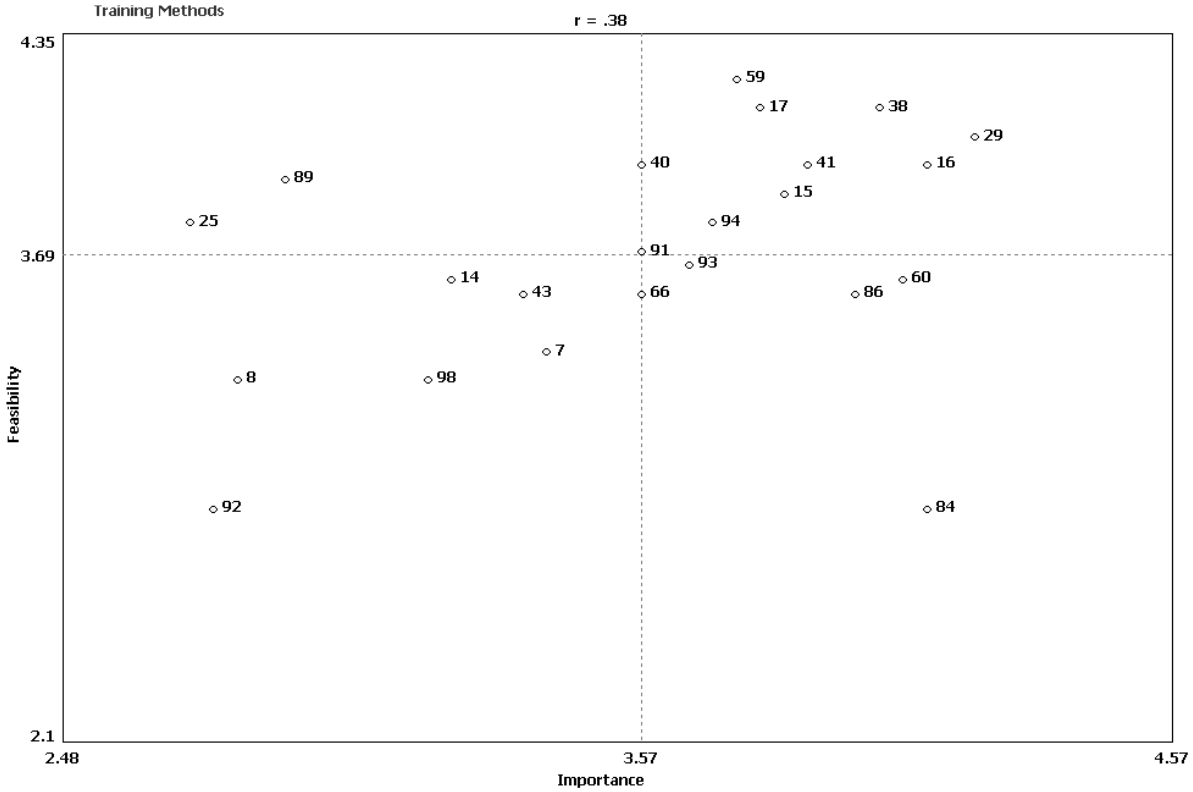
	Cluster 7: Work-place learning			BV	I	F
35	Make handover training attractive.			.26	3.95	3.45
20	Learning becomes immanent part of professional practice.			.27	4.19	2.60
51	Handover training is based on an in-depth analysis of the performance problem.			.29	3.76	3.30
90	Deliver the training (partly) 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**

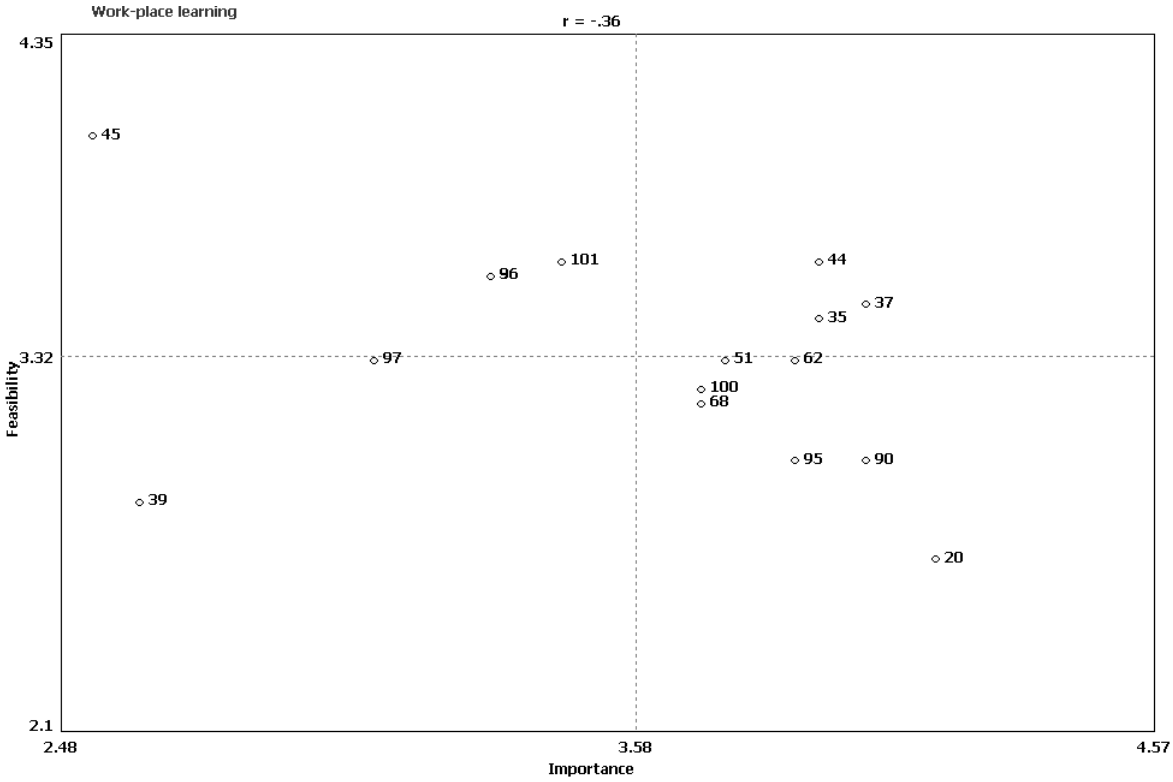
Appendix C. Position of statements in each cluster determined by their rating values ('Go-zones')

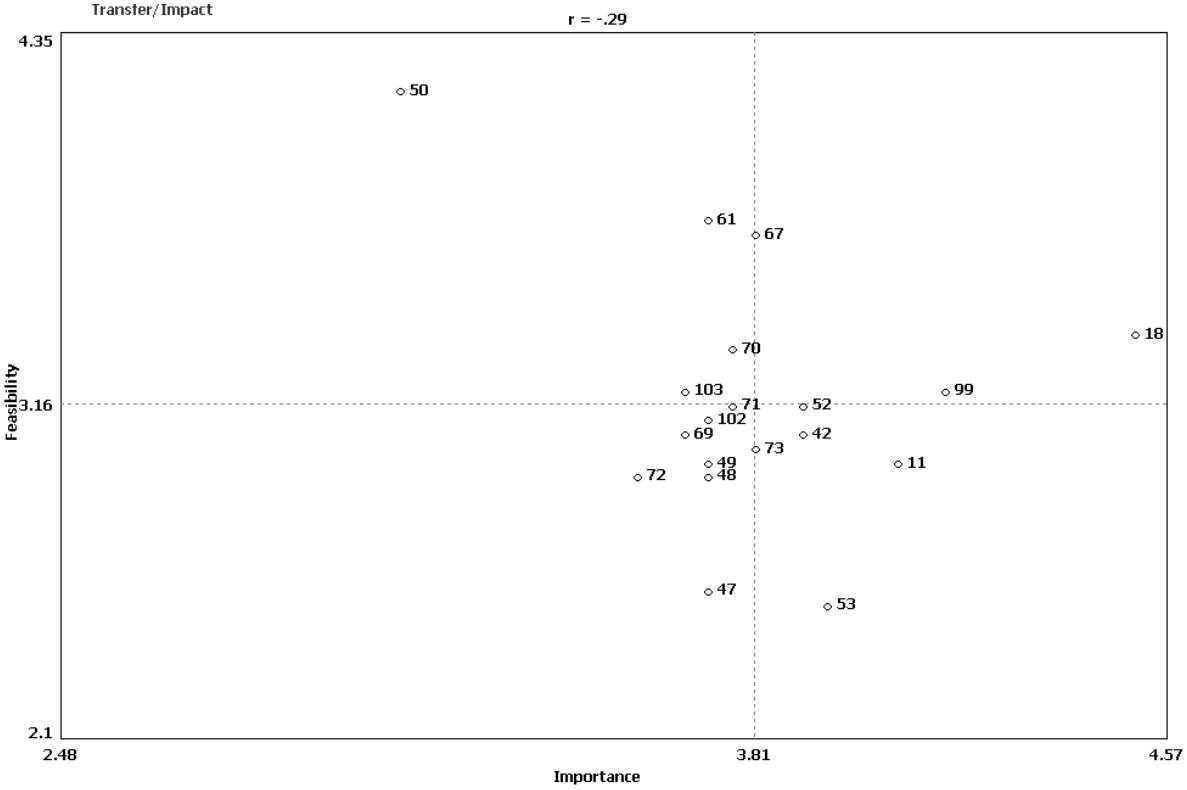


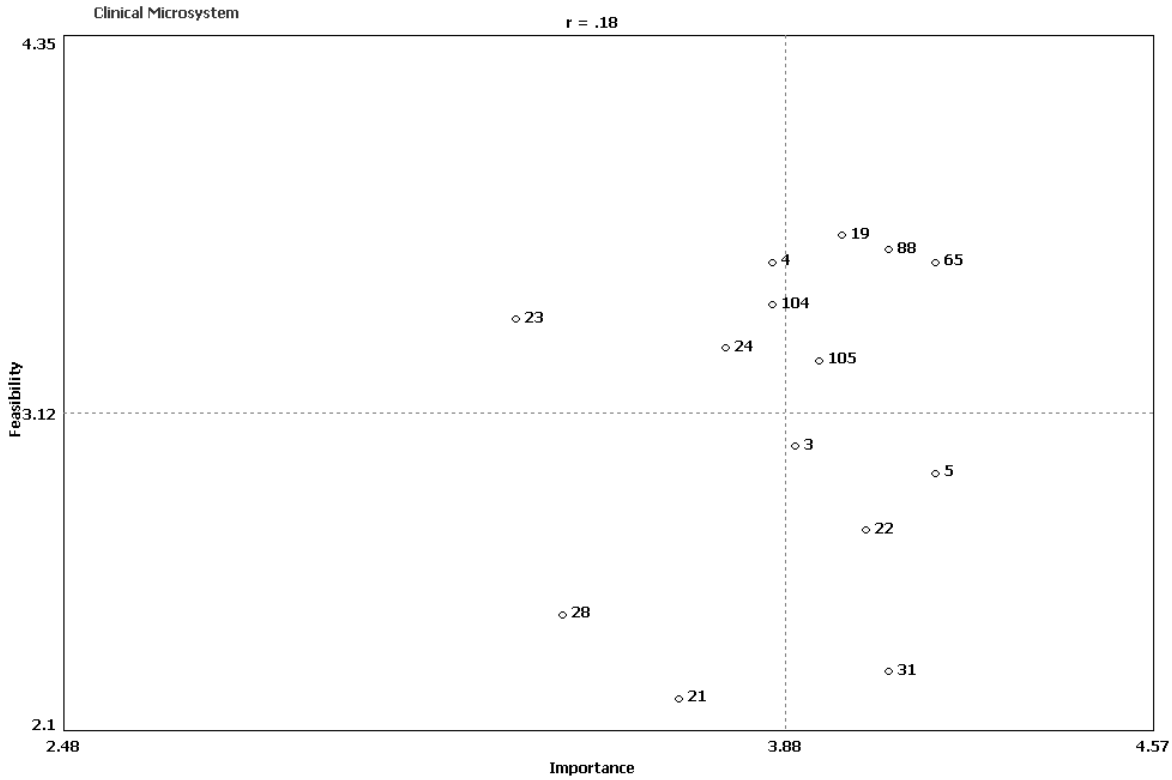



Coordination
r = -.06
4.35
3.6
2.1
Feasibility
2.48
3.6
4.57
Importance
26
76
77
27
85
6
56
32
33
78
87
34
46


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
48
72
11
47
53
2.48
3.81
4.57
Importance


Clinical Microsystem
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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

No	Statement	Cluster	I	F
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
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

No	Statement	Cluster	I	F
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