


Research Article

Learning Objectives, What's to Gain in Bedside Teaching?

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Abstract

Introduction: Bedside Teaching (BST) is defined as teaching in presence of a patient. Literature is not clear on learning objectives of students in BST. The aim of this study is to investigate the a priori learning objectives of students. Next to this, we want to investigate if students were more able to meet their own personalized learning objective, when discussing the objectives at the start of the session, and if this was related to satisfaction.

Methods: Prospective cohort study. Sixty-three 5th year medical students filled in questionnaires before and after BST regarding their learning objective and educational experience. IBM® SPSS® statistics version 26 was used for statistical analysis, we performed Pearson's Chi-square, Mann Whitney U, Mc Nemer and Fisher's exact.

Results: Most mentioned themes in objectives were clinical reasoning, physical examination and history taking. Students who chose an objective that matched with the patient/topic were more likely to meet their objective (48.9% n=22 vs 88.2% n=66, p= 0.000), were more satisfied (84.4% n=38 vs 98.5% n=67, p=0.006) and experienced more knowledge gain (80% n=36 vs 97.1% n=66, p= 0.006).

Conclusions: Students setting their own achievable learning objective in advance based on patient/topic, creates more satisfaction and more experienced knowledge gain in students.

Keywords: Bedside Teaching; Learning Objectives; Satisfaction

Abbreviation: BST: Bedside Teaching

Introduction

Bedside Teaching (BST) is defined as teaching in presence of a patient. It can be part of ward rounds or it can be planned as an explicit educational session. Students and teachers both see BST as a very important part of medical education [1-4]. BST contributes to skills in history taking, physical examination, communication and decision making, with role modelling as an important teaching tool [2, 4, 5]. Observation and feedback are important elements of the sessions [6]. Patients also appreciate bedside teaching. They like the attention and enjoy talking to students. There is time for them to ask questions and they gain a better understanding of their disease [2, 7, 8]. Despite of the known benefits, there is a decline in BST. In the 1960's 75% of the clinical teaching was bedside, where in the 2000's it was estimated that 8-19% of the teaching was bedside [4, 9]. The higher clinical workload and shortened admittance of patients are often cited as the cause of the decline [10, 11].

At our own clinic, a tertiary academic centre, we found in student feedback more and more requests for BST as part of Gynaecology and Obstetrics training. Considering the positive influences of BST, we re-instated it. Before implementing BST, we considered the learning objectives. For most teaching, teachers set learning objectives beforehand. However, BST can have multiple objectives and multiple objectives can be achieved during one session. Therefore, it is a perfect moment where students can set their own objective. We decided to perform this study to investigate the a priori learning objectives of 5th years medical students and to study if they matched the topic of the session and the learning objective of the teacher. Secondly, we want to investigate if students were more able to meet their own

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personalized learning objective, when discussing the objectives at the start of the session, and if this was related to satisfaction.

Material and Methods

Bedside teaching in the gynecology/obstetrics internship in our tertiary center is a weekly scheduled one- to two-hour session for 5th year medical interns. The teacher chose a patient and topic depending on the appropriateness of the admitted patients. Patients were asked for permission in advance and they were informed about the purpose of the educational session. We used evaluation questionnaires to gather information of the participating students, see Table 1 and the supplementary information for the questionnaires. Participation was completely voluntarily and anonymous. To link the multiple questionnaires of one student, they participated with a self-chosen number. This number was not traceable to the individual student and therefore we ensured the privacy of the students. To gather information about the learning objectives of the students, they filled in a pre-questionnaire prior the BST session, without knowing which patient or what topic would be discussed in the session. The learning objectives were not discussed in advance and the teacher

was blinded for the expected learning objectives written down by the students. The teacher had predefined learning objectives, appropriate for BST and matched to the patient, as skills in history taking, physical examination, communication and decision making. After completing the pre-questionnaire students received information about the patient. The students took history and, if the patient gave permission, they performed physical examination.

Additional diagnostics, including results and differential diagnosis were discussed at the bedside in medical terms, but also in understandable language for the patient. After spending fifteen to thirty minutes at the bedside, students and teacher continued their conversation, including discussion and feedback, in a conference room. Throughout the session, the teacher asked questions to stimulate their clinical reasoning, such as ‘why are you asking this?’ and ‘why would you want to do this blood test?’. These questions also encourage students to learn to explain to patients the reason for (additional) testing. At the end of the BST session, students filled in the post-questionnaire to evaluate if they’ve met their objective and to assess their satisfaction with the session. The answers of the questionnaires were entered in IBM® SPSS® statistics version 26. The data on the learning

Table 1: Questionnaires.

Questionnaire before bedside teaching (BST)	Answer possibilities
I have had BST in a previous internship	Yes / No
I think BST is a good form of education	1-10*, not applicable
I think BST is an important form of education	1-10*, not applicable
I found these previous teaching moments educational	1-10*, not applicable
At other BST moments I learned something about: (multiple answers possible)	<ul style="list-style-type: none"> • History • Physical examination • Communication • Differential diagnosis • Clinical reasoning • Respect for patient and / or family • Not applicable • Other, namely
My learning goal for today's BST is:	Free text
Comments:	Free text
Questionnaire after bedside teaching (BST)	Answer possibilities
I am satisfied with the BST today	1-10*
The discussed case and background information is relevant	1-10*
I gained knowledge	1-10*
I have learned something about: (multiple answers possible)	<ul style="list-style-type: none"> • History • Physical examination • Communication • Differential diagnosis • Clinical reasoning • Respect for patient and / or family • Other, namely
The education provided meets my (adapted) learning objective	1-10*
Why was de education (not) in line with the learning objective?	Free text
There was sufficient space for questions or personal input	1-10*
There was sufficient feedback	1-10*
I felt safe	1-10*
I think BST does / does not add value to my company because:	Free text
Comments/ feedback / points of improvement:	Free text

* a ten-point likert scale (1= completely disagree to 10 completely agree)

objectives were coded and organized into seven themes: clinical reasoning, history taking, physical examination, diagnostic testing, communication, knowledge and patient perspective. The free text data was examined, coded and organized into themes by two authors (S.V. and I.G.). The following statistical test were performed: Pearson’s Chi-square, Mann Whitney U, McNemar and Fisher’s exact.

Ethical approval

Ethical approval was waived by the ethical commission of the Amsterdam UMC (‘Medische Ethische Toetsingscommissie’), reference number W21_009. We followed the principles outlined in the Declaration of Helsinki. We didn’t register any personal information. As it concerned an completely anonymous evaluation, there was no need for informed consent. Students were given information about the purpose of the evaluation before the bedside teaching. They filled in the questionnaire voluntarily.

Results

A total of 63 students entered this study in 26 BST sessions. There were no refusers. Thirty-one (49%) students participated multiple times. Fifty-six (89%) of the students have had at least one BST-session during a previous internship (see Table 2). Learning objectives of BST sessions in previous internships were: history taking (57.1%), physical examination (89.3%), communication (39.3%), differential diagnosis (60.7%), clinical reasoning (82.1%) and respect for patient and/or family (28.6%). Five students had additional comments: three wrote having learned something about a specific or extraordinary disease, one learned something about technical aspects of equipment and one student observed disease perception of the patient.

We performed a first analysis after thirty students. We received 46 questionnaires from these thirty students. Eleven students participated multiple times. Some students described multiple themes in their objective, for example physical examination and

history taking. Most mentioned themes in objectives were clinical reasoning (65.2%), physical examination (41.3%) and history taking (30.4%), see table 3. Only 48.9% of the students judged that the education met their objective. Teacher and student objectives often did not match, but since multiple objectives can be achieved, this didn’t seem a problem. However, it was noticeable that the objectives of the students often did not match with the patient and/or topic of the BST session.

Since more than half of the students didn’t met their objective, we adjusted the beginning of the BST session. The student got the opportunity to set their learning objective based on information about the patient and topic. In this second group 35 students participated, of which 18 participated multiple times. Among the second group of participants we observed the same themes in learning objectives, clinical reasoning (58.8%), history taking (42.6%) and physical examination (19.1%), see Table 3.

Table 4 includes the results of the post questionnaire. In the second group more students judged that their learning objective was met during the education ($\chi^2_{(n=113)} = 21.059, p = 0.000$). In addition, they were more satisfied (fisher’s exact $_{(n=113)}, p = 0.006$). The students found the discussed patient to be more relevant (fisher’s exact $_{(n=113)}, p = 0.016$) and experienced a higher increase in their knowledge (fisher’s exact $_{(n=113)}, p = 0.006$). All students experienced a safe learning environment (fisher’s exact $_{(n=109)}, p = 1.000$) with sufficient space for questions (fisher’s exact $_{(n=109)}, p = 0.063$). Group 2 experienced more sufficient feedback (fisher’s exact $_{(n=109)}, p = 0.032$).

Discussion

This is the first study on the a priori learning objectives of medical students in BST and their satisfaction. Normally, teachers set learning objectives for education. BST is a form of education where multiple objectives can be addressed in one session. It is a suitable moment for students to set their own objective, based

Table 2: Pre-questionnaire: Previous BST sessions.

	Total (n=63)	Group 1 (n=30)	Group 2 (n=33)	p-value ^o
Have had BST in previous internships, n (%)	56 (88.9)	25 (83.3)	31 (93.9)	0.120 [‡]
BST is a good form of education: ≥ 8, n (%)	58 (92.1)	26 (86.7)	32 (97.0)	0.459 [‡]
BST is an important form of education: ≥ 8, n (%)	57 (90.5)	25 (83.3)	32 (97.0)	0.325 [¶]
BST is educational: ≥ 8, n (%)	52 (82.5)	21 (70.0)	31 (93.9)	0.387 [¶]
Learned at previous BST sessions, (multiple answers possible)				
• History taking, n (%) [*]	32 (57.1)	12 (48.0)	20 (64.5)	0.214 [‡]
• Physical examination, n (%) [*]	50 (89.3)	23 (92.0)	27 (87.1)	0.682 [¶]
• Communication, n (%) [*]	22 (39.3)	10 (40.0)	12 (38.7)	0.922 [‡]
• Differential diagnosis, n (%) [*]	34 (60.7)	13 (52.0)	21 (67.7)	0.230 [‡]
• Clinical reasoning, n (%) [*]	46 (82.1)	19 (76.0)	27 (87.1)	0.315 [¶]
• Respect for patient and / or family, n (%) [*]	16 (28.6)	7 (28.0)	9 (29.0)	0.932 [‡]
• Other (free text), n	5	3	2	

^o = p-value group 1 versus group 2

^{*} = percentage of students who have previously had BST

[‡] = Chi-square

[¶] = Fisher’s exact

Table 3: Pre-questionnaire: Learning objectives.

	Group 1 (n=46)	Group 2 (n=68)	Group 1 vs 2 p-value
Clinical reasoning, n (%)	30 (65.2)	40 (58.8)	0.491 [‡]
History taking, n (%)	14 (30.4)	29 (42.6)	0.187 [‡]
Physical examination, n (%)	19 (41.3)	13 (19.1)	0.010[‡]
Diagnostic testing, n (%)	1 (2.2)	3 (4.4)	0.647 [¶]
Communication, n (%)	3 (6.5)	6 (8.8)	0.738 [¶]
Knowledge, n (%)	7 (15.2)	18 (26.5)	0.154 [‡]
Patient perspective, n (%)	1 (2.2)	7 (10.3)	0.142 [¶]

[‡] = Chi-square

[¶] = Fisher's exact

[†] = Mc Nemar

Table 4: Post-questionnaire.

	All (n=113)	Group 1 (n=45)	Group 2 (n=68)	p-value
Satisfied with BST today: ≥ 8, n (%)	105 (92.9)	38 (84.4)	67 (98.5)	0.006 [¶]
Discussed case is relevant: ≥ 8, n (%)	106 (93.8)	39 (86.7)	67 (98.5)	0.016 [¶]
Knowledge gain: ≥ 8, n (%)	102 (90.3)	36 (80)	66 (97.1)	0.006 [¶]
I have learned about: (multiple answers possible)				
• History taking, n (%)	82 (71.8)	35 (76.1)	47 (69.1)	0.312 [‡]
• Physical examination, n (%)	17 (14.9)	8 (17.4)	9 (13.2)	0.508 [‡]
• Communication, n (%)	44 (38.6)	21 (45.7)	23 (33.8)	0.170 [‡]
• Differential diagnosis, n (%)	64 (56.1)	22 (47.8)	42 (61.8)	0.176 [‡]
• Clinical reasoning, n (%)	75 (65.8)	25 (54.3)	50 (73.5)	0.048 [‡]
• Respect for patient and / or family, n (%)	26 (22.8)	12 (26.1)	14 (20.6)	0.452 [‡]
• Other (free text), n	30	16	14	
Sufficient space for questions: ≥ 8, n (%)	106 (93.8)	41 (91.1)	65 (95.6)	0.063 [¶]
Sufficient feedback: ≥ 8, n (%)	86 (76.1)	30 (66.7)	56 (82.4)	0.024 [‡]
Safe learning environment: ≥ 8, n (%)	107 (94.7)	43 (95.6)	64 (94.1)	1.000 [¶]
BST meets learning objective : ≥ 8, n (%)	82 (72.6)	22 (48.9)	60 (88.2)	0.000 [‡]

[‡] = Chi-square

[¶] = Fisher's exact

on their current knowledge or skill gaps. We searched literature on students setting their own learning objectives. We only found studies on individualized or personal learning plans for an entire internship. In these studies students developed and implemented personal learning objectives. They found it a very useful addition and it enhanced their learning experience [12, 13]. We hypothesized that students setting an objective for a single educational session, based on their current needs or knowledge gaps, could enhance their knowledge gain and satisfaction. We studied if setting a learning objective matching the topic and/or patient would positively influence satisfaction and knowledge gain. Our results show that a learning objective matching the patient and/or topic, in other words an achievable objective, gives better results regarding satisfaction and experienced knowledge gain.

Our study has some limitations. We used a relatively small sample size, which can result in type II errors. However, we are the first to perform this type of research in BST and it was not possible to calculate a sample size. Since there were no refusers, we believe there is a low chance on selection bias. A second

limitation is the patient topics, our study was only performed on obstetric and fertility patients. Though the themes in the learning objectives are general, we believe these results can be applied on patients and BST in other departments. Another possible limitation is the experience in sufficient feedback. The second group experienced more sufficient feedback. We cannot explain this result with our data. Literature is also not clear on this. Gan et al. stated that teacher feedback indirectly influenced course satisfaction, influenced by the students interest in feedback [14]. It might be that the second group were more interested in the feedback, because they defined an achievable objective. Next to this, students are more satisfied with praise and compliments than with feedback [15]. However, the teacher did not differ her teaching and feedback strategy, and we believe the difference in experienced feedback influenced the results.

While physical examination was one of the prominent learning objectives, students indicated that that they've learned the least on it. We expect that is be due to the gynecological/obstetric population. If a patient gave permission, abdominal, lung, heart or neurological examination was performed. Gynecological

examination, such as speculum examination, vaginal toucher and vaginal ultrasound, was not performed because of the burdensome impact. The safe learning environment that the students experienced can have positive influence on them. A teacher creates this environment to show respect to the students and their level of knowledge. If students feel safe, they are more likely to ask questions and stretch their limitations. A safe environment enhances the motivation and learning of the students [16]. Since both groups experienced a safe learning environment ($p=1.000$), we don't believe this had influence on the other results. Despite the limitations and this being the first study on learning objectives and satisfaction in BST, we cannot deny the positive results: more satisfaction and more experienced knowledge gain in students when students set an achievable learning objective. Providing a learning objective at the beginning of an educational moment, directs the attention to this point [17]. Students setting their own objectives at the beginning, lets them focus on their own knowledge gaps and educational needs. Results might be applicable in other types of education which can have multiple learning objectives.

Conclusion

BST is a good educational moment for students to set their own learning objective. A very simple adaption in BST: setting a learning objective based on patient/topic; creates more satisfaction and more experienced knowledge gain in students. We recommend, when the education enables (for example within BST), to let students set their own objective.

Declarations

Ethical approval and consent to participate

Ethical approval was waived by the ethical commission of the Amsterdam UMC ('Medische Ethische Toetsingscommissie'), reference number W21_009. We followed the principles outlined in the Declaration of Helsinki. We didn't register any personal information. As it concerned a completely anonymous evaluation, there was no need for informed consent. Students were given information about the purpose of the evaluation before the bedside teaching. If they wanted to participate, they filled in the questionnaire voluntarily.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest

The authors declare that they have no competing interests.

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Authors' contribution

Both authors (S.V. and I.G.) had major contribution in all stages of the study, analyzing and interpreting the data and writing the manuscript.

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Appendix 1

Questionnaire prior to Bedside Teaching (BST)

Date:-.....-.....

Number:

(1 = totally disagree, 10 = totally agree)

I have had BST in a previous internship?	Yes						No				
I think BST is a good form of education	1	2	3	4	5	6	7	8	9	10	NA
I think BST is an important form of education	1	2	3	4	5	6	7	8	9	10	NA
I found these previous teaching moments educational	1	2	3	4	5	6	7	8	9	10	NA
At other BST moments I learned something about: (multiple answers possible)	<ul style="list-style-type: none"> • History • Physical examination • Communication • Differential diagnosis • Clinical reasoning • Respect for patient and / or family • Not applicable • Other, namely 										
My learning goal for today's BST is:											
Comments:											

Appendix 2

Questionnaire post Bedside Teaching (BST)

Date bedside teaching:-.....-.....

Number:

Subject BST:

(1 = totally disagree, 10 = totally agree)

I am satisfied with the BST today	1	2	3	4	5	6	7	8	9	10	
The discussed case and background information is relevant	1	2	3	4	5	6	7	8	9	10	
I gained knowledge	1	2	3	4	5	6	7	8	9	10	
I have learned something about: (multiple answers possible)	<ul style="list-style-type: none"> • History • Physical examination • Communication • Differential diagnosis • Clinical reasoning • Respect for patient and / or family • Other, namely 										
The education provided meets my learning objective	1	2	3	4	5	6	7	8	9	10	
Why was de education (not) in line with the learning objective?											
There was sufficient space for questions or personal input	1	2	3	4	5	6	7	8	9	10	
There was sufficient feedback	1	2	3	4	5	6	7	8	9	10	
I felt safe	1	2	3	4	5	6	7	8	9	10	
I think BST does / does not add value to my company because:											
Comments/ feedback / points of improvement:											

Appendix 3

Questionnaire prior to Bedside Teaching (BST)

Date:-.....-.....

Number:

(1 = totally disagree, 10 = totally agree)

I have had BST in a previous internship?	Yes						No				
I think BST is a good form of education	1	2	3	4	5	6	7	8	9	10	NA
I think BST is an important form of education	1	2	3	4	5	6	7	8	9	10	NA
I found these previous teaching moments educational	1	2	3	4	5	6	7	8	9	10	NA
At other BST moments I learned something about: (multiple answers possible)	<ul style="list-style-type: none"> • History • Physical examination • Communication • Differential diagnosis • Clinical reasoning • Respect for patient and / or family • Not applicable • Other, namely 										
My learning goal for today's BST is:											
If indicated, adjusted learning goal after discussing the patient and/or topic											
Comments:											

Appendix 4

Questionnaire post Bedside Teaching (BST)

Date bedside teaching:-.....-.....

Number:

Subject BST:

(1 = totally disagree, 10 = totally agree)

I am satisfied with the BST today	1	2	3	4	5	6	7	8	9	10	
The discussed case and background information is relevant	1	2	3	4	5	6	7	8	9	10	
I gained knowledge	1	2	3	4	5	6	7	8	9	10	
I have learned something about: (multiple answers possible)	<ul style="list-style-type: none"> • History • Physical examination • Communication • Differential diagnosis • Clinical reasoning • Respect for patient and / or family • Other, namely 										
The education provided meets my (adapted) learning objective	1	2	3	4	5	6	7	8	9	10	
Why was de education (not) in line with the learning objective?											
There was sufficient space for questions or personal input	1	2	3	4	5	6	7	8	9	10	
There was sufficient feedback	1	2	3	4	5	6	7	8	9	10	
I felt safe	1	2	3	4	5	6	7	8	9	10	
I think BST does / does not add value to my company because:											
Comments/ feedback / points of improvement:											