

Learning objectives, what's to gain in bedside teaching?

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Abstract

Background

Bedside Teaching (BST) is defined as teaching in presence of a patient. Literature is not clear on learning objectives in BST. The aim of this study is to investigate what the learning objectives of students are and whether students meet their objective.

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 within BST has positive influence on the educational experience of students.

Background

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 parts 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}

Also, in our tertiary academic centre there was a decrease in BST. In student feedback there was a request of more BST as part of Gynaecology and Obstetrics training. Considering the positive influences of BST, we re-instated BST. Before implementing BST, we considered the learning objectives of BST. Those were not clear from the literature. Therefore, we decide to perform this study with the aim to investigate what the learning objectives of 5th years medical students are and whether they meet their learning objective.

Methods

We used evaluation questionnaires to gather information of the participating students, see Table 1 and appendix 1 and 2 in de supplementary information. Participation was completely voluntarily and anonymous. To ensure privacy of the students, they participated with a personal number; that personal number was not traceable to the individual student for anyone.

Bedside teaching is in the gynecology/obstetrics internship a weekly scheduled one- to two-hour session for 5th year medical interns. The physician 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.

Prior starting the BST session, students filled in the pre-questionnaire, 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. 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 of (additional) testing. At the end of the BST session, students filled in the post-questionnaire.

After including 30 unique students we performed the first analysis to see if the procedure regarding the learning objectives should be adjusted.

The answers of the questionnaires were entered in IBM® SPSS® statistics version 26. 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.

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"> <input type="radio"/> History <input type="radio"/> Physical examination <input type="radio"/> Communication <input type="radio"/> Differential diagnosis <input type="radio"/> Clinical reasoning <input type="radio"/> Respect for patient and / or family <input type="radio"/> Not applicable <input type="radio"/> 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"> <input type="radio"/> History <input type="radio"/> Physical examination <input type="radio"/> Communication <input type="radio"/> Differential diagnosis <input type="radio"/> Clinical reasoning <input type="radio"/> Respect for patient and / or family <input type="radio"/> Other, namely

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

Questionnaire before bedside teaching (BST)	Answer possibilities
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 = strongly disagree to 10 strongly agree)	

Ethical approval

Ethical approval was waived by the ethical commission of the Amsterdam UMC ('Medische Ethische Toetsingscommissie'), reference number W21_009. They also waived the need for written informed consent as it concerned a completely anonymous evaluation. We followed the principles outlined in the Declaration of Helsinki. We didn't register any personal information. 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.

Results

A total of 63 students entered this study. There were no refusers. Thirty-one (49%) students participated multiple times. Fifty-six (89%) of the students have had at least one BST during an earlier internship (see table 2). Students indicated that during BST in previous internships, they had learned something about: 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 special disease, one learned something about technical aspects of equipment and one student observed on disease perception of the patient.

Table 2
– Baseline characteristics.

	Total (n = 63)	Group 1 (n = 30)	Group 2 (n = 33)	p-value
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)	32 (57.1)	12 (48.0)	20 (64.5)	0.214 [‡]
- History taking, n (%) [*]	50 (89.3)	23 (92.0)	27 (87.1)	0.682 [¶]
- Physical examination, n (%) [*]	22 (39.3)	10 (40.0)	12 (38.7)	0.922 [‡]
- Communication, n (%) [*]	34 (60.7)	13 (52.0)	21 (67.7)	0.230 [‡]
- Differential diagnosis, n (%) [*]	46 (82.1)	19 (76.0)	27 (87.1)	0.315 [¶]
- Clinical reasoning, n (%) [*]	16 (28.6)	7 (28.0)	9 (29.0)	0.932 [‡]
- Respect for patient and / or family, n (%) [*]	5	3	2	
- Other (free text), n				
* = percentage of students who have previously had BST				
‡ = Chi-square				
¶ = Fisher's exact				

As previously mentioned, after thirty students, we performed a first analysis. The data on the expected learning objectives were coded and organized into seven themes: clinical reasoning, history, physical examination, diagnostic testing, communication, knowledge and patient perspective. Some students described multiple themes in their objective. 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. It was noticeable that the objective of the other often did not match with the patient and/or topic. The second group of the participants had the opportunity to adjust their learning objective. They received some information the patient and topic after filling in the questionnaire. Then they could decide if their learning objective was appropriate and if no, they could

adapt it. The questionnaires can be found in the supplementary information, appendix 3 end 4. The format and execution of the education remained unchanged.

Among the second group of participants we observed the same themes in learning objectives, clinical reasoning (75%), history taking (36.8%) and physical examination (29.4%), with no statistical differences between the groups (see table 3). Twenty-seven of the sixty-eight students (40%) in group 2 adjusted their learning objective after having heard information about the patient and topic. Theme clinical reasoning decreased significant (McNemar $(n = 68)$, $p = 0.017$), the other types of objectives did not differ.

Table 3
Learning objectives

	Group 1* (n = 46)	Group 2* (n = 68)	Group 2adj* (n = 68)	Group 1 vs 2 p-value	Group 1 vs 2adj p-value	Group 2 vs 2adj p-value
Clinical reasoning, n (%)	30 (65.2)	51 (75)	40 (58.8)	0.259‡	0.491‡	0.035[†]
History taking, n (%)	14 (30.4)	25 (36.8)	29 (42.6)	0.459‡	0.187‡	0.424 [†]
Physical examination, n (%)	19 (41.3)	20 (29.4)	13 (19.1)	0.189‡	0.010‡	0.065 [†]
Diagnostic testing, n (%)	1 (2.2)	4 (5.9)	3 (4.4)	0.647 [¶]	0.647 [¶]	1.000 [†]
Communication, n (%)	3 (6.5)	4 (5.9)	6 (8.8)	1.000 [¶]	0.738 [¶]	0.625 [†]
Knowledge, n (%)	7 (15.2)	13 (19.1)	18 (26.5)	0.590‡	0.154‡	0.180 [†]
Patient perspective, n (%)	1 (2.2)	2 (2.9)	7 (10.3)	1.000 [¶]	0.142 [¶]	0.063 [†]
* = group 1 (pre-alteration), group 2 (post-alternation) and group 2adj (post-alternation, with the adjusted learning objectives)						
‡ = 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:	82 (71.8)	35 (76.1)	47 (69.1)	0.312 [‡]
(multiple answers possible)	17 (14.9)	8 (17.4)	9 (13.2)	0.508 [‡]
- History taking, n (%)	44 (38.6)	21 (45.7)	23 (33.8)	0.170 [‡]
- Physical examination, n (%)	64 (56.1)	22 (47.8)	42 (61.8)	0.176 [‡]
- Communication, n (%)	75 (65.8)	25 (54.3)	50 (73.5)	0.048 [‡]
- Differential diagnosis, n (%)	26 (22.8)	12 (26.1)	14 (20.6)	0.452 [‡]
- Clinical reasoning, n (%)	30	16	14	0.452 [‡]
- Respect for patient and / or family, n (%)				
- Other (free text), n				
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[‡]

* = group 1 (pre-alteration), group 2 (post-alternation)

‡ = Chi-square

¶ = Fisher's exact

Discussion

This is the first study to investigate the learning objectives of medical students in BST. The results indicate that themes of learning objectives most often are clinical reasoning, physical examination, history taking and knowledge. It was not a surprise that the focus for students was often on clinical reasoning. Clinical reasoning is the process from collecting information from the patient, understanding the problem or situation and plan and implement interventions. Our 5th year medical students have built their knowledge over the years and gained experience in patient care. They are now learning to apply their knowledge, one of their last steps in becoming a physician. The written

down learning objectives were sometimes specific for obstetric patients, but always had the same themes. Therefore, results can also be applied to other internships. All (n = 113) Group 1* Group 2* p-value

Our second aim was to investigate if the students meet their learning objective. In our education, teachers set the learning objectives. 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 on their knowledge or skill gaps. This probably will enhance their motivation and participation. The only difference between our groups is setting an objective with or without information about topic and/or patient. Setting a learning objective matching the patient and/or topic, in other words an achievable objective, gives clearly better results regarding satisfaction and knowledge gain.

While physical examination was one of the prominent learning objectives, students indicated that they've learned the least on it. We expect that is due to the gynecological/obstetric population. If a patient gave permission, abdominal, lung, heart and neurological examination was performed. Gynecological examination, such as speculum examination, vaginal toucher and vaginal ultrasound, was not performed because of the burdensome impact. There was a discussion about the indication and the implication of the results of these physical examinations during the BST.

Almost all students (88,9%) have had BST in a previous internship. Since we have no information about the frequency and amount of previous BST, we cannot compare this with the numbers of the literature mentioned in the introduction.

Students in the second group experienced more sufficient feedback. The teacher did not differ her teaching and feedback strategy. We cannot explain this result with our data, a limitation of this study.

A possible influence on the results can be the seniority of the teacher. The teacher for the BST sessions was a junior doctor with 3+ years of experience in gynaecology and obstetrics. Literature shows that students judge junior doctors as capable as senior doctors in bedside teaching.^{12, 13} Students are more comfortable being taught by a junior doctor, as they are more approachable and they are perceived to better understand the student's perspective. Senior doctors made the sessions more challenging with inconsistency in teaching and discussion of topics that are not part of the curriculum.¹⁴

Furthermore, based on our findings we can conclude that during BST a safe learning environment can be created. 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.¹⁵

Conclusion

BST is an important form of education during intern training. Learning objectives as clinical reasoning and history taking can easily be achieved. If students formulate achievable learning objectives in advance, the chance that these objectives are met is higher, resulting in more satisfaction and experiencing a higher increase in their knowledge. We recommend, when the education enables (for example within BST), to let students set their own achievable objective.

List Of Abbreviations

BST Bedside Teaching

Declarations

Ethical approval and consent to participate

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consent as it concerned a completely anonymous evaluation. We followed the principles outlined in the Declaration of Helsinki. We didn't register any personal information. 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.

All (n = 113)

Group 1* (n = 45)

Group 2* (n = 68)

p-value

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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Not applicable

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	All (n = 113)	Group 1*	Group 2*	p-value
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