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TRAINING

Outcome-based education: Principles and practice

S. MUKHOPADHYAY & S. SMITH

Department of Obstetrics and Gynaecology, Chesterfield Royal Hospital NHS Foundation Trust, UK

Summary
Outcome-based education is a recent development in modern curriculum planning. The attributes of a good trainee are defined first and the ways to achieve them are suggested next. Outcome-based educational models have been used successfully. This paper deals with the application of 12 learning outcomes to a very relevant educational intervention from the Royal College of Obstetricians and Gynaecologists (RCOG): the Labour Ward Advanced Training Skills Module (ATSM, relating to advanced labour ward practice) and assessing their suitability for the same. The second part of the paper deals with principles and methods of assessment. Assessment is important in an outcome-based model, as it allows us to decide whether trainees have learnt what was expected to be learnt. The assessment tools in the labour ward ATSM have been critically appraised. It has been stressed that a good doctor's practice is a congruous blend of knowledge, skills and attitudes, rather than executing these domains in isolation.

Keywords
ATSM, Bloom's taxonomical objectives, Miller's pyramid and assessment tools, outcome-based medical education

Introduction

An educational outcome refers to what a student or a trainee should be able to perform at the end of a course (Spady 1993). On the other hand, an educational objective refers to what a student should have learnt by the end of a course. In outcome-based education, one plans backwards: the attributes of a successful trainee are defined first and the ways to achieve them are suggested next. Therefore, in such a model, 'product defines the process' (Harden et al. 1999). Models of outcome-based education were first developed in the USA in a bid to develop high quality student performance.

Bloom (1968) developed the concept of 'mastery learning', in which a fixed level of performance was to be achieved in a variable length of time and space. The General Medical Council (GMC 1993) in the UK voiced the same in its document, 'Tomorrow's Doctors'. Thus began the search for viable outcomes in medical education. The model has since been adopted in medical schools worldwide (Simpson et al. 2002; Smith et al. 2003). The Brown medical school (Rhode Island, USA) model utilises nine learning outcomes that incorporate the use of basic sciences, diagnosis, management and prevention of disease, life-long learning, moral aspects and ethics, to name a few. Harden et al. (1999) summarised the essence of this and several similar models in a three circle concept. In three concentric circles, the author mentions tasks (doing the right thing), attitudes (doing the thing right) and finally, professionalism (the right person doing it). Criticisms of objective-based education included the artificial separation of knowledge and skills, and the constraints of time needed to gather the same. However, given the current educational climate, an outcome-based model seems entirely appropriate: it delineates the roadmap of 'fitness to practice' and suggests ways to achieve the same.

The Scottish doctor model has 12 outcomes categorised in three broad sections (Simpson et al. 2002). In short, this model utilises outcomes relevant to each of the three circles (Harden 1986). These outcomes (the Dundee 12 outcomes) are divided into three major categories as mentioned above.

What the doctor is able to do:

(1) Clinical skills
(2) Practical procedures
(3) Patient investigations
(4) Patient management
(5) Health promotion and disease prevention
(6) Communication
(7) Medical informatics

How the doctor approaches his/her practice:

(8) Basic, social and clinical sciences
(9) Attitudes, legal responsibilities and legal understanding
(10) Clinical reasoning processes

Correspondence: S. Mukhopadhyay, 15 Sycamore Drive, Calow, Chesterfield S44 5DX, UK. E-mail: drsujitmuk@yahoo.co.in

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The doctor as a professional:

(11) The role of the doctor within the health service
(12) Personal development.

There is evidence to suggest that outcome-based models in education actually benefit students. In 1997, the Medical School at the University of Dundee adopted an outcome-based approach for all 5 years of the curriculum. The difficulties faced during the initial implementation have now been replaced by a salubrious change. In a survey of Pre-registration House Officers (PRHOs) in the UK, Goldacre et al. (2003) found large differences between medical schools as to how well prepared PRHOs felt before they started house jobs. The work was conducted by researchers at Oxford University. Of the 23 medical schools studied, the PRHOs at Dundee had a positive response rate of 80%, the highest among all medical schools in the UK (Davis and Harden 2003). The US Accreditation Council on Graduate Medical Education (ACGME 2003) also urges residency programmes to adopt an outcome-based approach to education.

This paper describes the applicability of the 12 Dundee outcomes to an important educational intervention developed by the Royal College of Obstetricians and Gynaecologists (RCOG): The labour ward ATSM (Advanced Training Skills Module relating to advanced labour ward practice).

What is the labour ward ATSM?

The labour ward ATSM (relating to advanced labour ward practice and not relating to the labour ward lead module) is the module most frequently undertaken by advanced trainees under the auspices of the RCOG. This makes perfect sense, given the directive of 24-h consultant presence on the labour ward in the near future. A closer look at the ATSM reveals the importance of Bloom's taxonomical objectives (Bloom 1956). In the knowledge component, the module is meant to provide trainees with an in-depth understanding of all aspects of intrapartum care. In the psychomotor skills component, the module states the outcome: the advanced trainee should be in a position to make difficult surgical decisions on the delivery suite and perform relevant operations without supervision and know when to ask for help. In the attitudinal component, the advanced trainee is expected to undertake audit, review evidence-based literature and produce guidelines. The last mentioned component is not strictly 'attitudinal', rather a combination of knowledge, skills and attitudes and therefore it still satisfies the criteria to be called 'outcomes'.

If one were to translate the 12 Dundee outcomes to the ATSM, does one find it to be an appropriate example? The debate generated is discussed here.

The first category deals with: *What the doctor is able to do*. There are seven outcomes under this section.

1. Competence in clinical skills

The ATSM states clearly that the advanced trainee should be competent in managing both normal and abnormal labours. This will include a proper focussed history, examination with a chaperone and trying to achieve a reasonable working diagnosis. For example in a case of pre-term premature rupture of membranes (PPROM), the trainee should be able to confirm the diagnosis by performing a speculum examination, arranging special tests like the Actin Partus test to confirm presence of liquor, arrange for fetal monitoring and institute/change antibiotic therapy (erythromycin is the antibiotic of choice in this condition). The module goes further in stating that the advanced trainee should be in a position to arrange *in utero* transfer, if the need arose. The importance of a learning outcome is explicit here; one can actually monitor a trainee's progress throughout the module, e.g. the trainee becomes gradually more confident in identifying the sick premature baby and arranges transfer accordingly. The module states clearly defined criteria for each such clinical encounter that the trainee has. In this respect, the Dundee outcome (1) seems to be suitable for the module.

2. Competence to perform clinical procedures

Outcomes of clinical competency have been stated clearly in the ATSM: as an example, the trainee should confidently perform all types of instrumental delivery, and be confident in performing difficult caesarean sections for extremely pre-term babies, placenta praevia, abdominal adhesions, etc. In a broader perspective, the module also states the reasons when the advanced trainee should call for help, e.g. in a case of major praevia. The clinical competence of the trainees can be measured with the use of Objective Structured Assessment of Technical Skills (OSATS) that the RCOG provides. The attitude of the trainee to a difficult surgical decision can also be monitored. In this respect, the Dundee outcome (2) is suitable for the module.

However, there are a few drawbacks:

- The module does not state clearly the number of operations in each category necessary to achieve clinical competence.
- The module demands competency in rare surgical cases like emergency cervical cerclage, obstetric hysterectomy, etc. Advanced trainees might feel 'left out' while performing these procedures, simply because these are rare procedures. Therefore, the Dundee outcome (2) is not suitable for rare surgical procedures or for complicated ones where the case is best managed with a team of surgeons.

3. Competence to investigate a patient

In a woman presenting with a fit in labour, does the trainee recognise that the most common cause is eclampsia until proven otherwise? Does one arrange appropriate tests to confirm or refute the same? The module goes further by stating that the advanced trainee should also liaise with medical colleagues to rule out other causes of fits in labour, e.g. epilepsy or even an intracerebral pathology. Does the trainee understand the meaning of these tests?

The module therefore reinforces the fact that the trainee should arrange tests appropriate for a patient and a particular clinical situation. In this respect, the Dundee outcome (3) is suitable for the module.

4. Competence to manage a patient

This has been appropriately envisaged in the ATSM making outcome (4) suitable:

For example:

- In acute care does the trainee understand that a case of HELLP syndrome is best managed in an ITU setting?
- Does one involve physicians, anaesthetists, and blood bank professionals in the patient's care? (multiprofessional involvement)
- Does one realise that general surgical input would be needed if such a patient were to go to theatre? (recognising appropriate treatment, i.e. delivery and involving other professionals).

What the module does not mention is to what level should basic clinical science be incorporated into clinical practice? Is it acceptable for the trainee to formulate a plan for intrapartum diabetes management or to clearly write the pathophysiological principles underlying such management? Things such as above have not been discussed in the module clearly.

5. Competence in health promotion and disease prevention

The labour ward ATSM urges trainees to recognise the 'obstetric communities at risk', e.g. teenage pregnancies, drug abusers, victims of domestic violence and psychiatric patients, etc. It is stated that recognition of these groups and extending care can decrease maternal mortality rates as evidenced by the confidential enquiry into maternal deaths. The 'community picture' of an obstetric patient comes into view and in this respect, the Dundee outcome (5) is suitable for the module.

However, the module does not state the exact referral points for such cases and the pathways of referral. In this respect, the above outcome fails to meet the expectancies of the module; also assessment tools for this section (except interprofessional communication) are not clearly stated.

6. Competence in the skills of communication

Can the advanced trainee communicate a diagnosis and a management plan clearly to his patients and colleagues? Can he/she break bad news? For example can the trainee deliver the necessary aspects relating to a post-mortem examination in case of intrapartum stillbirth? Outcomes such as these are clearly stated in the ATSM, including the assessment tools necessary to measure this outcome (team observation reports). Trainees are urged to go on special courses that deal with breaking bad news and with communication skills in difficult situations.

The outcome (6) is therefore suitably executed by the module.

7. Competence to retrieve and handle information

Considering the fact that about two-thirds of litigation in the NHS arises from the labour ward itself, the ATSM sets explicit criteria regarding: proper documentation, the timing of events, counselling after 'things have gone wrong', etc. Assessment tools relating to data handling include a section of the team observation forms that specifically addresses these issues. In this respect, the outcome (7) is suitable for the module.

However, the amount of minimum knowledge about computers and their use is not clearly mentioned, this is a drawback of the module.

The second section (circle) deals with: *how the doctor approaches their practice.*

8. With an understanding of basic, clinical and social sciences

A fairly common problem is used here as an example: a third-degree perineal tear. The module states clearly that the trainee should have a good grasp of anatomy of the anal sphincters, before one starts suturing. In the social aspect, the module wants clear counselling regarding the future management of a perineal tear and counselling for future delivery. Such outcomes have also been stated clearly for the management of malpresentations in labour, medical complications in pregnancy and intrapartum complications. In these aspects, the Dundee outcome (8) is perfectly suitable for labour ward ATSM.

9. With appropriate attitudes, ethical understanding and legal responsibilities

The module states clearly expectations from the trainee as regards counselling and obtaining consent. In a primigravid patient who opts for a vaginal breech delivery rather than a caesarean section, has the trainee mentioned in the consent form that the Term Breech Trial predicted a four-fold increased mortality for the baby with a vaginal birth? Does the trainee discuss ethical aspects of delivery at extremely premature gestations, e.g. at 23 weeks and 5 days, and does one involve paediatricians in such a discussion? The advanced trainee is expected to attend labour ward forums and risk management meetings to understand the legal aspects of obstetrics, e.g. the steps necessary to label a case of cerebral palsy to be intrapartum in origin or not.

The importance of patient confidentiality has been mentioned with the use of the Caldicott principles. The RCOG's labour ward Management Course, a must for advanced trainees doing this module, even provides interaction with lawyers who deal with these problems. The outcome (9) is suitably applied to the module.

10. With appropriate decision-making skills, clinical reasoning and judgement

This is an appropriate outcome in view of the following facts:

- Evidence-based practice is emphasised, e.g. magnesium sulphate is the drug of choice for treating eclampsia
- Reviewing guidelines: the advanced trainee should review at least one existing guideline and formulate one based on evidence
- Promoting reflective practice: should be evidenced by the trainee's portfolio
- An audit relating to labour ward practice.

The third category deals with: *the doctor as a professional.*

11. Appreciation of the role of a doctor within the health service

The labour ward ATSM aims to produce clinicians who can manage cases clinically, who can impart skills to juniors, can develop management skills (particularly for trainees finishing as labour ward lead) and develop a willingness for research (trainees are urged to report rare medical problems in pregnancy to UKOSS, an organisation that keeps a record of such cases to achieve reasonable conclusions).

In these respects, the outcome (11) fits perfectly well into the module.

12. Aptitude for personal development

The ATSM urges all trainees to keep a portfolio. This incorporates self-discovery and reflection. The ATSM mandates attendance in multiprofessional obstetric courses like the Advanced Life Support in Obstetrics (ALSO) and the Management of Obstetric Emergencies and Trauma (MOET), attendance in the labour ward management course conducted by the RCOG. Rehearsal of acquired skills and transfer to juniors is facilitated by labour ward fire drills.

In this respect, outcome (12) is suitable for the module.

Thus, the labour ward ATSM successfully fulfils most of the learning outcomes stated in the Dundee model. The drawbacks in successful implementation have also been discussed above.

Other aspects of outcome-based education and their suitability to the labour ward ATSM

Once the outcomes have been clearly defined, the next step is to design assessment tools to determine whether trainees have achieved the level of learning that was initially expected. The framework for modern assessment is based on Miller's pyramid (Miller 1990). A trainee progresses through four sequential levels: *knows, knows how, shows how* and *does*. An assessment, by definition, has to be valid, reliable and reproducible, and for it to work, it also has to be feasible and practical. What are the assessment tools mentioned in the ATSM?

If the current module dealt with testing Bloom's taxonomical objectives, it is imperative that one searches for such tools.

To assess the knowledge component, the module plans to use Mini Clinical Evaluation Exercises (CEXs), case-based discussions (CBDs). Multiple choice questions (MCQs) and extended matching questions (EMQs) have not been suggested in the module. It has been said that MCQs are reliable, discriminatory and objective, whereas EMQs go a step further in testing higher cognitive levels. Therefore, it would be useful to incorporate these tools to test the advanced trainee. It is heartening to see that multiple encounter CBDs have been incorporated into the module; at least six such exercises have been provided in the ATSM itself. The use of multiple encounters increases validity. The objective structured clinical exam (OSCE) has also been omitted, probably because it is labour intensive and expensive; however, they test a wide variety of the subject matter and enable the cognitive domain to be assessed at a deeper level than factual. OSCEs therefore promote an *in vitro* assessment of trainees. If feasible, an OSCE assessment of the advanced trainee should be in place as a part of the ATSM.

The psychomotor skills of the advanced trainee are assessed using the RCOG objective structured assessment of technical skills (OSATS). These have a procedure-specific checklist, a generic skills assessment and a three-point rating scale to assess documentation, insight and attitude. This provides a fairly accurate assessment of psychomotor skills of the trainee. Five OSATS meant to test skills of the advanced trainee are already incorporated in the ATSM. With the general assumption that senior trainees would be surgically more competent than junior ones, OSATS offer a good measure of construct validity (the ability to distinguish different levels of surgical competence).

A difficulty arises as to how the attitudinal skills of the trainee are best assessed. The use of team observation reports has been suggested here. Such reports are equivalent to a 360 degree assessment. However, such forms occasionally contain information that is circumstantial, uncorroborated and subjective. If the team observation sample is small, it may skew the overall scores. Therefore, the RCOG suggests a large sample, about 10–15 forms per trainee. Notwithstanding the disadvantages, this remains a best yet attempt to assess values, attributes and team working qualities of a trainee. It is encouraging to note that particular emphasis has been placed on these forms for successful execution of the ATSM.

At every step in the module, a log of experience is desired from the trainee. Advanced trainees achieve this by maintaining a portfolio. The portfolio is assessed at regular intervals by the consultant in charge of the ATSM. In simple terms, a portfolio is repository of one's personal professional goals and the means necessary to achieve such goals. The critical factors of portfolio-based assessment are goal-setting, self-reflection and discovery (Friedman Ben David et al. 2001).

In the context of education, reflection is a deliberate and purposeful activity. An example of reflective learning (cerebral palsy arising out of intrapartum causes) is cited here.

In the first stage, the trainee develops an awareness of uncomfortable feelings (e.g. an outcome of intrapartum cerebral palsy). This leads to the second stage of examination of components of the situation (e.g. events in labour and fetal heart tracing). The third stage relates to developing a summary of outcomes (e.g. the accepted criteria that fulfil intrapartum cerebral palsy as a diagnosis). The final stage relates to actual action in real life scenarios (e.g. the ability to act on poor heart tracings in labour, proper documentation of a poor outcome, etc). The essential value of reflection is also supported by Kolb's experiential learning cycle (Kolb 1984). Only in recent years has the RCOG urged trainees to keep a record of their reflective experiences. It would be worthwhile if the ATSM used reflective experience liberally to assess professionalism among advanced trainees.

Conclusion

In this paper, we have tried to assess the suitability of outcome-based education to the labour ward ATSM. The components of the ATSM have been critically appraised using an 'exit outcome' model. Also, we have looked into assessment instruments incorporated in the ATSM and offered suggestions to make it work better. It is a well

accepted fact that a curriculum or intervention in medical education is slow to start with and slower to change. However, if the change is beneficial, it gets incorporated and makes the intervention more robust. Rather than using knowledge, skills and attitudes in isolation (as is often used in objective based curricula), outcome-based education recognises the fact that an advanced trainee's clinical practice is a harmonious blend of the above attributes. This, more than anything else, is the greatest strength of outcome-based education.

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References

ACGME. 2003. ACGME Outcome Project 2001. Accreditation Council on Graduate Medical Education. Chicago, IL. 19 December. Online. Available at: www.acgme.org/outcome/comp/compFull.asp.

Bloom BS. 1956. Taxonomy of educational objectives: The Classification of Educational Goals: Handbook 1, Cognitive domain. London: Longman.

Bloom BS. 1968. Learning for mastery. UCLA-CSEIP. Evaluation Comment 1:1–5.

Davis MH, Harden RM. 2003. Planning and implementing an undergraduate medical curriculum: the lessons learned. Medical Teacher 25:596–608.

Friedman Ben David M, Davis MH, Harden RM, Howie PW, Ker J, Pippard MJ. 2001. AMEE Guide No. 24: Portfolios as a method of student assessment. Medical Teacher 23: 535–551.

General Medical Council. 1993. Tomorrow's doctors: recommendations on undergraduate medical education. London: GMC.

Goldacre MJ, Lambert T, Evans J, Turner G. 2003. Preregistration house officers' views on whether their experience at medical school prepared them well for their jobs: national questionnaire survey. British Medical Journal 326: 1011–1012.

Harden RM. 1986. Ten questions to ask when planning a course or curriculum. Medical Education 20:356–365.

Harden RM, Cosby JR, Davis MH. 1999. An introduction to outcome-based education. Medical Teacher 21:7–14.

Kolb DA. 1984. Experiential learning: experience as the source of learning and development. Englewood Cliffs: Prentice Hall.

Miller G. 1990. The assessment of clinical skills/competence/performance. Academic Medicine 65:S63–S67.

Simpson JG, Furnace J, Crosby J, Cumming AD, Evans PA, Friedman Ben David M et al. 2002. The Scottish doctor-learning outcomes for the medical undergraduate in Scotland: a foundation for competent and reflective practitioners. Medical Teacher 24:136–143.

Smith SR, Dollase RH, Boss JA. 2003. Assessing students' performance in a competency based curriculum. Academic Medicine 78:97–107.

Spady WG. 1993. Outcome based education, ACSA Report No. 5. Belconnen, ACT: Australian Curriculum Studies Association, PO Box 884, Belconnen, ACT 2616, Australia.