

CLINICAL PRACTICE

An evaluation of Electrocardiogram (ECG) lead placement training in an Integrated Care Organisation

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Received: August 30, 2018

Accepted: March 7, 2019

Online Published: March 27, 2019

DOI: 10.5430/jnep.v9n7p76

URL: <https://doi.org/10.5430/jnep.v9n7p76>

ABSTRACT

For several years, in-house clinical skills training has been used in hospitals and clinical settings. There has been a dramatic increase in recent years in the usage of clinical skills training to underpin role development and improve practice standards among healthcare professionals. This article describes the evaluation of an evidence-based electrocardiogram (ECG) lead placement training that was devised and implemented by the Whittington Health NHS Trust Clinical Education Department to meet the gap in training needs. The findings will provide the department with facts if the trust is on the right path of accomplishing its planned goals to support role expansion, expert improvement and alteration in practice to improve patient care.

Key Words: Clinical education, Continuing professional development, ECG placement, Nursing care, Service development, Service improvement, Training and development

1. BACKGROUND

Whittington Health NHS trust became one of the first Integrated Care Organisation (ICO) in the UK in April 2011. Ham and Curry^[1] defined integrated care as a practice where health care suppliers are suited to incorporate their services, allowing them to work together through chains and affiliations. Evidence from the Department of Health (DoH)^[2] illustrated that the aspiration of the changing public services schedule is to find pointers for excellence development. Ham and Curry^[1] identified that the welfares of this schedule will be accomplished by oneself if coalition or institutional unification is adapted to support clinical and service incorporation.

Nursing responsibilities are swiftly emerging alongside improvement in research, applied science and therapy. Nursing staff are entrusted with an extensive field of specialised healthcare duties that were formerly the assignment of lower-

ranking medical practitioners. The need to broaden nurses' roles is being promoted by the DoH.^[3] Melby et al.^[4] stated that nursing staff used to provide compliant care but are increasingly practicing independently at a higher level and are leading on expert nursing skills as well as expert medicine skills. A study by Lowery et al.^[5] reported that nurses and doctors initiated similar health results in the management of patients with chronic heart failure.

According to the Nursing and Midwifery council (NMC)^[6] nurses need continuing professional development (CPD) so that their ability and experience can remain current to maintain ongoing safe practice and providing adequate care. Succeeding the incorporation of the Whittington Hospital with Haringey and Islington Primary Care Trusts, the trust's hospital and public services were amalgamated and broadened. With consistent enlargement of services there is a requirement to equip the workforce with the necessary competence

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to deliver across perimeters and divisions, therefore the obligation for innovative preparation programmes to back expert improvement and alteration in practice.^[7]

Following the study of a clinical skill training programme that was devised and delivered to enhance ability and experience within the organisation,^[8] the electrocardiogram (ECG) lead placement training was established as another area of training needs and professional development to promote role expansion. The Medical Device technicians of the Whittington Health NHS Trust, who originally were training staff on how to input data, to check and to troubleshoot an ECG machine have identified from the attendees that the placements of the ECG leads were not covered as part of the training. In view of the demand and the gap, the Clinical Education Department was approached to develop an evidence-based training package that would meet the needs that are required for their CPD.

2. LITERATURE REVIEW

The Society for Cardio logical Science and Technology (SCST)^[9] suggested that approximately 300 million ECGs are recorded per year in Europe alone and there is evidence that many health professionals who records an ECG, have not been adequately trained or assessed in this skill. An ECG is a non-invasive procedure that implicates electrodes to be arranged in a specific order on the skin of the chest and limbs. The electrodes are connected to a machine that records the rhythm and electrical activity of the heart. This procedure is used to study signs of a potential heart problem, such as angina (chest pain), suddenly evident heartbeats (palpitations), light-headedness and shortness of breath alongside other tests to help investigate and observe conditions distressing the heart.^[9] Rudiger et al.^[10] reported that health care practitioners lack essential knowledge in the ECG recording technique and as a result, many ECGs are unjustifiably recorded. Batchvarov et al.^[11] goes further to state that incorrectly recorded ECGs may result in inaccurate diagnoses and unsuitable treatments. As per Tahler et al.^[12] there is indication that training results in fewer ECG recording errors, but it implies that many practitioners are not conscious of their need for training. The SCST^[9] have provided guidance that all health care professionals who undertake the recording of an ECG should be appropriately trained and qualified.

The National Quality Board^[13] stated that therapy and treatment delivered by the National Health Service (NHS) intend to be of a great excellence if it is secure, efficient and correlated with specific patient outcomes. Bailey^[14] mentioned that quality improvement constitutes a wide field of exercises of diversifying scales of intricacy and scientific and analytical accuracy over which healthcare suppliers expand,

implement and weigh moderate involvements; those that work well are analysed and achieved more widely to enhance clinical training.^[14]

The NHS improvement^[15] has devised a nationwide structure as a model on how to improve advanced foundation of professional and personal qualities as well as developing leadership skills and aptitude supervision for people working in the NHS. With health care services needs constantly altering it is therefore essential to establish diverse improvement requirements among staff working in NHS across England. The intent of the structure is to prepare and inspire staff to provide steady advancement in local health care organisations and obtain satisfaction and contentment from their labour.^[15]

Aims and objectives

The training plan's aim was for all health professionals to improve their practice by effectively recording an ECG using an evidence-based technique. The objectives for the training were that staff would determine the recommended way to:

- Recognise the right patient and gain consent prior to the process.
- Organise the patient, the essential supplies and the setting prior to process.
- Undertake the process by means of recommended technique.
- Record the process correctly in the patient's records.
- Use their clinical reasoning to regulate any problem experienced.

3. IMPLEMENTATION OF THE ECG LEAD PLACEMENT TRAINING PLAN

The authors (AP) and (NR) were identified as the designated nurses to develop and deliver an ECG placement training plan that would be consistent through the establishment. The authors (AP) and (NR) were involved in devising the plan and the author (NR) was involved in its delivery and implementation.

The ECG placement training plan was devised using the NHS Improvement^[15] model as a guideline. The training incorporated the latest evidence-based from SCST^[9] and the DoH.^[16] Five key knowledge and awareness were acknowledged that health professional must take into consideration in their practice when performing a process. These were:

- Preparing the patient.
- Preparing supplies and the setting.
- Applying evidence-based technique.
- Recording appropriately.
- Regulate any problem experienced.

The training plan was devised in four parts, with individual period running up to 90 minutes. Part one of the training consisted of a twenty minutes PowerPoint presentation over-seeing the abstract of: What is an ECG, Electrical Activity of the Heart, Purpose of the ECG, ECG Recording, Equipment and Patient Preparation and Causes of Artefact. Part two of the training was a 10-minute applied demonstration of setting-up and programming an ECG Machine. Part three of the training was a 15-minute applied demonstration on recommended technique of applying ECG electrodes on a full-sized structural human model, connecting the ECG Machine to the electrodes and recording an ECG.

The last part of the training was the evaluation procedure; once the staff had experimented the applied processes, they must show what knowledge they had gained on the human model. Staffs were evaluated by means of an observed structured clinical examination (OSCE) evaluation tool (see Figure 1). Due to the applied characteristic of the training and OSCE evaluation, individual training period was restricted to a maximum of six staffs. As soon as the staffs were considered to have acquired the essential skill, a certificate of competence was supplied to them. A training evaluation form was completed by the staffs following each individual period.

ECG lead Placement Assessment

Preparation:	Yes	No
1.1 Equipment Preparation		
Working ECG Machine, ECG Paper, ECG Electrodes, Skin Prep (Cleaning Wipes and razors)		
1.2 Patient Preparation		
Recognise the right patient & Gain Consent		
Describe process to patient and response to any queries		
Ensure patient is aware to be relaxed for procedure		
1.3 Environment Preparation		
Ensure Privacy & Dignity- Draws Curtains/ privacy Sign		
2.0 ECG Procedure		
Ensure patient is in comfortable position, i.e. Supine & head elevated		
Decontaminate hands as per Infection Control		
Enter Patient Details on ECG Machine		
Prepare skin for ECG Electrode placement (i.e. skin free from grease, dirt, hair)		
Apply ECG Electrodes on patient using recommended technique		
Connect ECG leads using recommended technique		
Inform patient to keep as still as possible		
Check for appropriate ECG display on Machine		
Record/Print ECG		
Review ECG and take appropriate action if necessary, (i.e. Poor Quality ECG, Leads disconnected, Poor Skin prep)		
Disconnect Machine & Remove ECG Electrodes		
Inform patient that the Doctor will review ECG		
Ensure patient can dress/cover up before opening curtains		
Decontaminate Hands		
Decontaminate Equipment appropriately and return to storage area		
Inform Doctor & Document accordingly		

Figure 1. ECG lead placement assessment

4. EVALUATION OF ECG LEAD PLACEMENT TRAINING PROGRAMME

4.1 Structured periods and attendance

From February 2015 to September 2017, two periods were run weekly on a monthly basis to sustain continuing training. The periods were provided after lunch as of 1:00 pm to 2:30 pm and as of 2:30 pm to 4:00 pm to heighten turnout, subsequently these intervals were suitable for staff to be unconstrained for training from their clinical areas. A total of 44 periods over 22 days were planned to educate frontline clinical staff such as Staff Nurses, Midwives, Healthcare Support workers and Student Nurses. The training periods were publicised on the online education and training catalogue and a duplicate of the training schedule was circulated to service leads and line managers. All reservation requirements were completed through the department's administrators and logged on the organisation's automated staff record. Ten periods were void over the length February 2015 to August 2016 as no reservation requirements were made. There was some staff that pulled out or did not attend. Eighty-seven staff in total attended the training with 35 (40%) staff nurses, 10 (12%) Health Care Support Workers, 7 (8%) Midwives and 35 (40%) student nurses therefore reflecting a good overall diversity of attendance rate.

4.2 Data collection

After each training period the staffs were requested to complete a training evaluation form. A total of 81 forms were collected out of the 87 staff that attended. The form reflected data with satisfaction level of the training scored from 1 (very poor) to 5 (excellent). Similarly, data about the significance of the ECG lead placement training to clinical practice and if it would encourage change in practice was also requested. Staffs were also recommended to inscribe additional commentaries and proposals on the textbox section of the training evaluation form.

4.3 Data analysis

Polit^[17] suggested that study of data is 'the systematic organisation and synthesis of research data'. The study of data takes place in parallel with a data collection. The quantitative data from the evaluation forms where analyse using descriptive analysis and the qualitative data using content analysis.

Descriptive Analysis helps to interpret and explain the aspects of a specific data set, by providing short synopsis about the sample and measures of the data. This method was appropriate to analyse the overall satisfaction with the training which was scored on the evaluation form from 1 (very poor) to 5 (excellent) and also about the significance of the ECG

Lead placement training to the nurses and whether it would encourage alteration in their clinical practice.

According to Cavanagh,^[18] Content Analysis is a research method that has become more popular in health studies in recent years and is viewed as a flexible approach for analysing text data. This method was more appropriate to analyse the textbox comment section of the evaluation forms to collect any crucial information with regards to the training programme. The authors (AP) and (KE) were involved in analysing the data collected using a pragmatic approach to identify themes.

4.4 Findings

The evaluation forms from 81 attendees who attended the training between February 2015 and November 2017 were reviewed and the feedback analysed. Attendees were asked to score the training on a scale of 1 (very poor) to 5 (excellent). Overall 64 attendees scored 5, 14 attendees scored 4, 1 attendee scored 3 and 2 attendees scored 1 for overall satisfaction of the training (see Figure 2). The average score was 4.8/5. Attendees were also asked if they felt the training was relevant to their practice and if the training will alter their practice. If the training was relevant to their practice, 96% (n = 78) responded yes, 2.5% (n = 2) responded no and 1.5% (n = 1) did not respond (see Figure 3). If it will alter their practice 77% (n = 62) responded yes, 9.5% (n = 8) responded no and 13.5% (n = 11) did not respond (see Figure 4).

Attendees were also given the opportunity to make additional comments, 48% (n = 39) of the attendees provided positive feedback about the training, some (n = 6) found it enjoyable and many (n = 21) gave their thanks for the session. Many (n = 29) commented on how the session gave them a better understanding of the topic "very clear teaching on the topic" "very informative session" and "it was explained in detail". Twenty-five attendees commented that they found the training useful or helpful "really useful session and reinforces the correct practice" and "I learnt a lot from this and work in cardiology so it helped". Three people commented on the need for this training "there should be more of such training to be done".

Fifteen people commented that the training had increased their confidence "I now feel confident doing an ECG" "made me feel confident in ECG taking". Sixteen percent (n = 13) of attendees commented positively about the trainer, with attendees commenting about the friendliness "very friendly and spoke well to me", his experience and knowledge "very thorough with his explanation" and thoroughness "all of my questions were answered in detail".

Others (n = 11) commented on the demonstration and time to practice the skill “the demonstration was so useful” “helpful that I was able to practice it as well”. There were some suggestions for changes or improvements many of these focused on the practical element either asking for a human volunteer or more technical manikin, so the experience was more realistic “a dummy on which the machine works on would be ideal”, other would have liked to have samples of the readings produced by the procedure.

be assessed” and “more practice sessions to be carried out on the ward”. Two people commented that the “guidance may be different for different departments” and 1 asked if it was possible to “write length (time) of session on certificate for re-validation”. The only negative comment was that the training room was too cold therefore not a good learning environment.

5. DISCUSSION

A report by Grossi and Lynch^[19] recommended education and training of ECG lead placement for both medical and nursing staff, irrespective of grades in anticipation that this will diminish the figures of lead misplacements and inaccurate recording which can represent a risk to patient management. Medani et al.^[20] recommended regular refreshers training, supported by peers, to ensure practitioners maintain their competency at correct ECG lead placement.

The overall positive feedback received from the evaluation of the ECG lead placement training plan demonstrated that the ICO is on the right path of accomplishing its planned commitments of confirming education and training are sustained to provide safe, excellence in care that establishes cost effectiveness, encourages adaptability and promotes contribution with its enlargement of services.

However, the authors should address some of the suggestions highlighted in the findings so that the quality of the training can be improved. The author (AP) will investigate into developing an E-learning module to cover the theoretical aspect of the training which attendees will need to complete prior to attending the face-to-face session. The E-Learning module will provide more flexibility and will allow staff to complete the module at their own pace and time. This method will release an extra 20 minutes to focus on the more practical aspect of the training session as suggested by some of the attendees.

The author will also investigate the possibility of having a volunteer, so the attendees can have real-life scenario to practice and obtain an ECG reading. Alternatively, the author will have to discuss with senior nursing team the potential of acquiring a more advance human model that can provide various ECG readings however cost implication could be a barrier to this option. Those improvements could potentially boost staff confidence prior to practicing on a real patient with more complex needs. Once the new implementations are in place the author will have to conduct a follow-up evaluation study.



Figure 2. The training satisfaction level



Figure 3. The relevance to practice

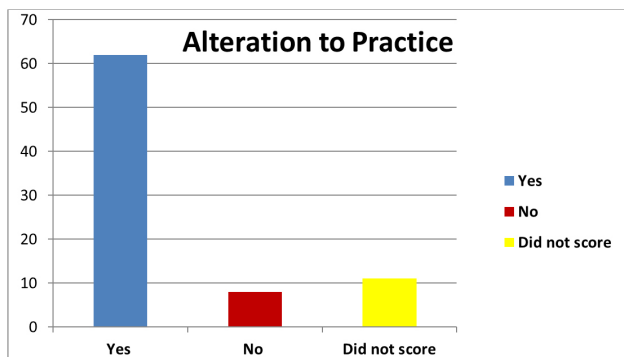


Figure 4. The alteration to practice

Additionally, people asked for more time to practice and be observed “bit more time would be nice so we could all

6. CONCLUSION

The positive feedback of the training plan substantiates how training and development can sustain the trust in accomplishing its planned goals by making sure staffs are provided with the right expertise, educations and proficiencies to supply excellence in care. This is in favour of the trust's staff strategy of being state-of-the-art, receptive and adaptable to the

varying clinical requirements of the regional residents and its goal to ease admissions and re-admissions by organising patient care and the services it provides in the most efficient way.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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