Knowledge and practice of cardiopulmonary resuscitation among Nigerian doctors

B. A. Solagberu

Department of Surgery, University of Ilorin Teaching Hospital, Ilorin, Nigeria.
Reprint requests to: Dr Babatunde A. Solagberu, P. O. Box 4377, Ilorin Nigeria. E-mail: basolagberu@yahoo.com

ABSTRACT

Background: Cardiopulmonary resuscitation (CPR), first described in 1960, is observed to be poorly applied in quality and quantum, hence, the need to ascertain its correct knowledge and practice among Nigerian doctors.

Methods: Questionnaires were distributed randomly to doctors in a Nigerian University Teaching Hospital. Respondents returned the unsigned questionnaires into a sealed box to protect their identity. There were 45 questions covering theories and practice of CPR.

Results: Fifty-six of 94 (59.6 %) doctors returned their questionnaires; comprising 16 Interns, 21 Registrars, 8 Senior Registrars, 7 Consultants and 4 others. Twenty of the 56 respondents (35.7 %) would do CPR for only 20 minutes, 25%-89% respondents (mean 61.6% ± 24%) did not know items absolutely essential for CPR, 37 (66.1%) could not use adrenaline effectively either by route of administration or dosage, 25 (44.6%) would use inappropriate venous access, and majority (41 of 56, 73.2 %) would not use blood gas analysis, urine output, ECG to monitor response to CPR. Thirty-nine (69.9%) listed lack of materials as the greatest problem faced in carrying out CPR. Thirty-eight (67.9%) believed other doctors' knowledge of CPR was inadequate and 54 (96%) felt doctors needed to update their knowledge of CPR.

Conclusion: Cardiopulmonary resuscitation is associated with problems of lack of materials, and demonstrable inadequate knowledge and application of its pathophysiology as more than two thirds of the respondents believed other doctors' knowledge of CPR was inadequate.

These three parameters may be responsible for the observed poor success rate in CPR. Efforts to correct these should improve CPR success rate among Nigerian doctors.

Keywords: Cardiopulmonary resuscitation, Cardiac arrest, Respiratory failure, Nigeria.

Introduction

Observations from a previous study of death records of patients in emergency room in a Nigerian teaching hospital revealed that resuscitation was attempted in every case but it was neither systematized nor sufficiently aggressive.[1] This technical incompetence, and possible inadequate training, on the part of physicians was noticed also in the United Kingdom, thus, encouraging the Royal College of Physicians of London to issue a report in 1987.[2] Cardio-pulmonary resuscitation (CPR) was first described in 1960 by Kouwenhoven, Jude and Knickerbocker for victims of sudden cardiac or respiratory arrest but its application was extended with some success to any patient with cardiac arrest regardless of underlying cause.[3, 4] Therefore in forty years, discussions on CPR has expanded but the initial enthusiasm of a great discovery with success rates of 74 % by Kouwenhoven et al has given rise to low results of 5 % and the controversy of "Do Not Resuscitate" (DNR) orders among physicians.[3, 4] Evidently, improving CPR in patients— who want and deserve it— is a worthy step in reducing mortality.

A combination of poor economy and a dearth of certified clinicians in intensive care in Nigeria make carrying out of CPR—basic or advanced—a somewhat frustrating phenomenon. This unacceptable situation warrants reversal. Commonly, during mortality meetings, a statement depicting our poor and inadequate CPR practice is: "all resuscitative efforts failed and patient was certified dead". The quality and quantum of efforts often prove to have been defective and grossly inadequate. Patients hardly survive CPR here even when they could have done so judging by their pre-morbid parameters. This result contrasts with success rates varying from 31 % to 44 % in the developed world.[5, 6] our poor situation should not be so considering that we have a relatively low incidence of coronary artery disease—compared to the developed world. Coronary artery disease has been blamed for the poor result in the developed world. This situation calls for a re-examination of our CPR practice to determine the size of the problem and highlight possible areas of improvements as Lemire and Johnson from Canada noted increasing CPR survival rates from 13.5 % in 1960-1964 to 22.6 % in 1966-1970 suggesting improvement with systematized practice.[7] Hence, this study to assess the knowledge of resuscitative efforts, and the practice of CPR by, doctors in a Nigerian University Teaching Hospital.

At present, two colleges are involved with certification of consultants in our University Teaching Hospitals, the West African Postgraduate Medical College and the National Postgraduate Medical College of Nigeria.[8] Advanced Trauma Life Support (ATLS) and the Advanced Cardiac Life Support (ACLS) courses are not mandatory before final examination of these colleges. It remains to be proved the relationship between poor CPR knowledge and practice and lack of certification in desirable courses as represented by both the ACLS and ATLS. It would appear that life support seminars and courses are justifiable going by the poor performance of CPR in our setting.

Materials and Methods

Questionnaires were distributed randomly to doctors practising at the University of

Ilorin Teaching Hospital Ilorin, Nigeria. The unlabelled questionnaires were picked by respondents from a designated file. The respondents were provided a box to drop their filled forms so that the answers were not traceable to them. Measures were also taken in the questions to allow for anonymity. There were 45 items to respond to. Questions asked included specialty and years of practice of the respondents, their fund of knowledge, life support courses attended and their practice of CPR, problems encountered and doctors' perception of each other's knowledge of resuscitation. The returned forms were analysed.

Results

Demographic Information

Of 94 questionnaires distributed, 56 doctors, 49 males and 7 females, returned a filled questionnaire each, giving 59.6 % compliant rate. The distribution by specialty, years of practice and cadre is shown in Figures 1 to 3, respectively. Their qualifications include 47 Bachelor of Medicine, Bachelor of Surgery (MB, BS) only and 8 holders of additional Fellowship while 1 person had undeclared qualification. Seven of 56 (12.5 %) respondents had attended a life support course; 2 each in Basic Trauma Life Support (BTLS) and ATLS, while 2 attended both BTLS and ATLS, 1 respondent did not name any course.

Practice of CPR

The frequency of carrying out CPR and the belief in DNR orders are shown in Figures 4 and 5 while the extent of CPR varied among respondents, Figure 6. Forty-five respondents will refer patients to the Intensive Care Unit (ICU), 8 respondents will not, while 3 gave no answer. Fifty (89.3 %) answered "Yes" to using "mnemonics" to aid practice of resuscitation.

Table 1: Questions answered fairly well

Questions (Answer)	No. of respondents answering correctly (%)	No. of respondents answering wrongly (%)
In a shock state, which disappears first, respiration or heartbeat (respiration)	35 (62.5)	21 (37.5)
Normal heart rate (60-90/ min)	51 (91.1)	5 (8.9)
Normal respiratory rate (12-20/ min)	48 (85.7)	8 (14.3)
How do you recognise a patient needing CPR?	50 (89.3)	6 (10.7)
2 to 3 methods of restoring respiration	44 (78.6)	12 (21.4)
2 to 3 methods of restarting an arrested heart	47 (83.9)	9 (16.1)
Diagnosing respiratory failure	45 (80)	11 (20)
Size of canula for CPR (adult 14/16, children 20/ 22 FG)	31 (55)	25 (45)

Table 2: What equipment/material/drug do you think is/are absolutely necessary for CPR?

Number of respondents not mentioning an essential item	Number of respondents mentioning essential items
14 did not mention adrenaline (25 %)	42
18 did not mention oxygen (34 %)	38
21 did not mention ambu bag (38 %)	35
36 did not mention i.v. fluids ± plasma expanders (64 %)	20
39 did not mention airway (70 %)	17
43 did not mention suction machine (77 %)	13
45 did not mention Electrocardiogram (80 %)	11
50 did not mention i.v. canula (89 %)	6

Table 3 Questions answered poorly

Questions	Worrisome findings and number of respondents (%)
During CPR, after a chest massage and you need a drug to restart the heart, what drug is it?	7 did not mention the drug (12.5)
What is the dose?	37 gave ineffective doses—16 wrong doses; 21 didn't remember dosage (66.1)
What route of administration	16 mentioned wrong route (28.6) (s.c or i.v.)
Of the 45 getting diagnosis of respiratory failure (see Table 1)	17 did not know what to do (37.8)
Giving fluids in CPR	31 respondents will use inappropriate venous access—27 using peripheral vein, 2 any vein, 2 do not know (55)
Skills for	
venous "cut down" (VCD)	Only 13 of 56 have skill (23.2)
endotracheal intubation (ET)	Only five have skill (8.9)
(VCD + ET)	Only 20 have both together (35.7)
Neither VCD nor ET	16 have neither (28.6)
To treat pneumothorax	18 will puncture much lower intercostal space (32.1)
33 will puncture 2nd space (58.9 %)	
5 will puncture 3rd space (8.9 %)	

Table 4: Monitoring the response to therapy in CPR

Parameter Monitored	Number using parameter (%)	No not indicating use (%)
Heart/pulse rate	47 (83.9)	9 (16.1)
Respiratory rate	42 (75)	14 (25)
Blood pressure	32 (57.1)	24 (42.9)
Blood gas analysis	15 (26.8)	41 (73.2)
Urine output	15 (26.8)	41 (73.2)
Central venous pressure	11 (19.6)	45 (80.4)
Level of consciousness	10 (17.9)	46 (82.1)
Electrocardiogram	5 (8.9)	51 (91.1)

Figure 1: Distribution of respondents by specialty
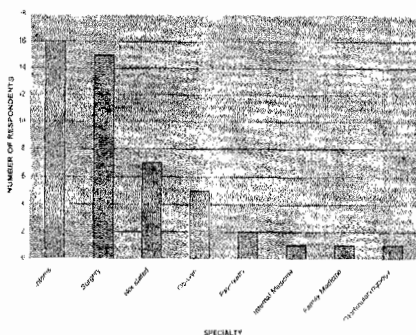
Figure 3: Distribution of respondents by cadre
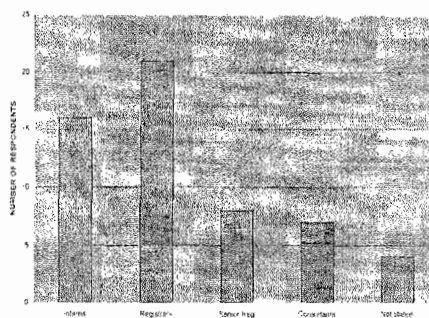
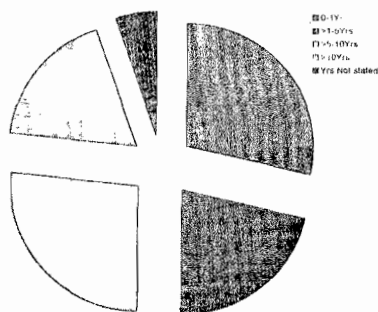*Figure 2: Years of practice of respondents*
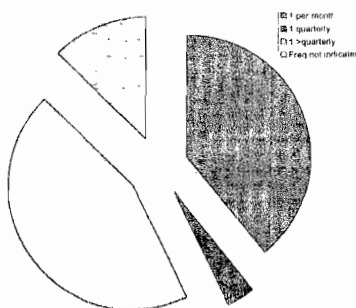

Figure 4: Frequency of CPR by respondents

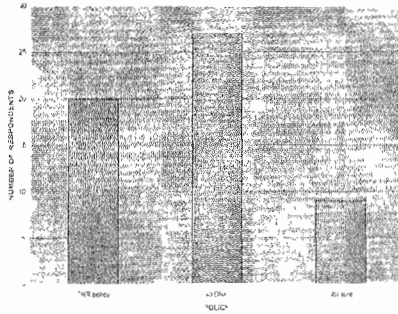*Figure 5: Policy of 'do not resuscitate' among respondents*
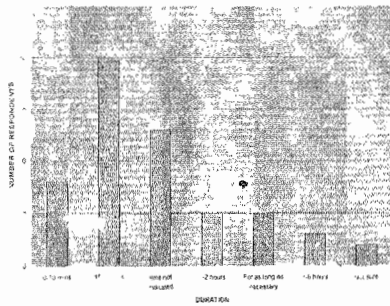

Figure 7: Items in CPR process

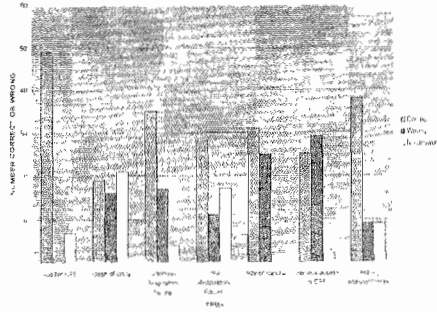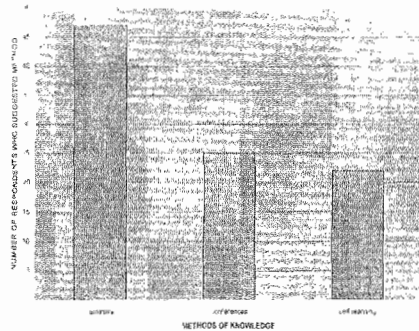*Figure 6: Duration of CPR in practice*

Figure 8: Suggested methods of updating knowledge

Theoretical and practical knowledge

Table 1 and Figure 7 show answers to questions on the theory and practice of CPR. Additionally, respondents were asked to list items, drugs or materials absolutely essential for CPR, 51 (91.1 %) listed 27 items, drugs or materials. But for an emergency situation, 8 items are considered the basic minimum: injection adrenaline, oxygen, ambu bag, intra-venous fluids and plasma expanders, airway, suction machine, electrocard-

iographic (ECG) machine, and canula (Table 2). Hence, 14 to 50 respondents (25 % to 89 %, mean 61.6 % ± S.D 24 %) would not stock the emergency requirements properly, because they did not list the basic minimum. One respondent named electricity generator as essential, as patients are sometimes lost during power outage because suckers would not work.

In restarting an arrested heart, 49 (87.5%) identified adrenaline as the

appropriate drug including one respondent who named dobutamine, seven (12.5 %) gave no answers or did not remember the drug i.e. 1 in 8 patients will encounter doctors who would not know what to do when the heart stops! Sixteen gave wrong dose of adrenaline while 21 did not remember the dose making 37 ineffective answers (66.1 %). Sixteen gave wrong route of administration (28.6 %). If the heart has responded and patient is still not breathing, 45 respondents (80 %) gave correctly the diagnosis, 11 couldn't (20 %) (Table 1). Other answers are shown on Table 1 and Figure 8.

Parameters to monitor response to therapy were asked for; 47 mentioned heart or pulse rate, 42 respiratory rate, 32 blood pressure, 15 blood gas analysis, 15 urine output, 11 central venous pressure, 10 level of consciousness and five will monitor ECG changes. The four asterisked signs are more reliable but only a few (5 to 15 respondents, 8.9 % to 26.8 %)) will use them, suggesting poor monitoring of CPR (Table 4).

Problems encountered during CPR

Certain problems encountered in carrying out CPR were asked for. At least 15 different problems were mentioned by 49 respondents (7 gave no answers). The commonest being lack of materials mentioned by 39 respondents (69.6 %), lack of drugs 17 respondents (30.4 %), lack of cooperation from nurses and paramedical staff, 6 respondents (10.7 %), power failure 4 respondents (7.1 %) and equipment not appropriate to size of patient by the 2 paediatricians. Forty-three respondents (76.8 %) believe the problems can be corrected. In assessing themselves, thirty-eight doctors (67.8 %) believe their colleagues have inadequate

knowledge of resuscitation, while 11 (19.6 %) believe the knowledge is adequate while one was ambivalent. Most respondents (54, 96 %) believe doctors need updating of knowledge; the suggested methods of education are shown in Figure 8. Fourteen (25 %) believe the courses should be organised yearly, 14 (25 %) believe bi-ennial while 11 (20 %) preferred 3-5 yearly and 1 respondent said there was no need for revalidation of course.

Discussion

Closed chest cardiac massage was discovered fortuitously in the late 1950's when Kouwenhoven and Jude found that by applying pressure or blows to the chest of experimental animals contraction of the heart and a rise in blood pressure ensued.[9] Before then, thoracotomy and open AC defibrillation was the only means of treating cardiac arrest. Further animal experiments and by February 1959, Dr Henry Bahnson became the first person to save a patient by applying CPR.[9] Public demonstrations of CPR to doctors, nurses and paramedics were done at John Hopkins generating a lot of doubts but by 1960, closed chest cardiac massage was first fully described.[3] Many individual institutions report their success rates because the saved lives could have been added to the hospital deaths prior to establishment of CPR as we know it today.[5, 6, 7, 10] This enthusiasm led to a broadening of the scope of CPR. Its success rates, thus, predictably fell from an all time high of 70 % (14 of 20 patients) by Kouwenhoven et al, which has not been duplicated ever since, to as low as 5 %.[2, 3] Evidently, some patients with metastatic cancer, sepsis, pneumonia

and acute stroke with neurological deficit did not benefit from CPR.[11] Indeed, the necessity for CPR for all patients was questioned because whereas one third of patients will be saved by the initial resuscitation, only a third of this will be discharged home alive.[11] Cardiopulmonary resuscitation is a traumatic, time consuming and expensive technology that should be reserved for those for whom there is a reasonable chance of survival to discharge.[5] The poor results noticed when this reality was appreciated dampened enthusiasm and led to new terminology for some patients who were labelled "Do Not Resuscitate" (DNR). The wisdom of the practice of DNR eroding patient autonomy was questioned by the public. Hence new words—futility and value—crept into CPR practice.[12, 2] Whereas a doctor applying his knowledge based on CPR success rates for certain diseases can conclude the futility of carrying out CPR based on the probability of survival from the disease; a value judgement on the patient who really should have sole responsibility to determine self value has unwittingly been passed, going beyond the doctor's role. Therefore, DNR orders ought to be discussed with the patients or their surrogates for their input. In spite of everything, success rates of CPR improved from 13. 5 % to 22.6 %.[7] This underscores the need for good practice of CPR. Overall, 1 in 5 or 6 patients will benefit from CPR.[7] Indeed, results are generally better when CPR is restricted to its original indications, rather than the expanded new indications.[2, 4]

Against the backdrop of the developing countries lagging behind in health care delivery, it has become important to document the magnitude of the problem of CPR in our environment.

Our response rate of 56 respondents out of 94 doctors (59.6 %) is higher than the 34 respondents of 80 doctors (42.5 %) in a questionnaire-based study on CPR in the UK.[13] Majority of our respondents (27 of 56, 48.2 %) believe all patients should be resuscitated while 20 (35.7 %) would give DNR orders, Figure 5. They would do so without consent of patients or their surrogates. This was also the finding of Saunders who reported that: "in practice, doctors rarely discuss CPR with their patients, especially in the United Kingdom".[2] This lack of policy on resuscitation often confuses the junior doctors who are primarily the ones reached whenever the need for CPR arises. Other workers have pointed out this fact.[14, 15] Indeed, the consultant should make the decision for DNR by following the guidelines extensively proposed in the UK and the USA.[2, 11, 14, 15]

The author is not aware of any known study on the knowledge and practice of CPR in Nigeria. Assessing both is relevant to determining our own success rate and contribution to literature on the subject. Many respondents (38 of 56, 67.8 %) affirmed that they encounter doctor colleagues whose knowledge of CPR is inadequate, while only 11 of 56 (19.6 %) believe their colleagues' knowledge of CPR is adequate. One respondent was ambivalent. Invariably, almost every respondent was indirectly assessing himself and others through the questionnaire, with generally poor results—Tables 1-4. Almost all the respondents, 54 of 56 (96 %) believe there is a need for updating of knowledge through seminars (84 %), conferences (45 %) or by self-learning (39 %). A useful mnemonic for remembering doses of adrenaline is urgently needed since 89.3 % remembered the steps of resuscitation

using "ABCD" mnemonic. None of the 15 problems disclosed in this study by 49 respondents would probably exist in the developed world, the commonest being lack of materials for CPR by 39 (69.6 %, vide supra). It is valid to blame these problems as contributory to poor knowledge of CPR in our practice setting. The reality is that their existence precludes medical students and young doctors from witnessing an ideal CPR as done in established centres. Whatever these individuals know could be what is garnered from the books or classroom teaching only. Hence, it is not surprising that important monitoring parameters like urine output, blood gas analysis, electrocardiogram and blood pressure would not be mentioned by a sizable number of respondents. This also explains why many would not consider intravenous canula, electrocardiogram, suction machine and airway as absolutely essential for CPR.

Twenty of 56 respondents (35.7 %) would use 15-30 minutes for CPR. It has been suggested that CPR lasting longer than 30 minutes appears to be uniformly unsuccessful, it should be abandoned except in unusual circumstances.[6] Going beyond 30 minutes is not only a waste of resources including manpower, but it can be harmful to the patients. In the opinion of Saunders, "inflicting pain, grief, or suffering or interrupting a timely death where there is minimal potential benefit, constitutes cruelty".[2] It is hoped that the result of this work will form a basis for improving CPR in Nigeria.

Acknowledgment

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