

Visual Biofeedback: Adjunct Mirror Intervention during Stage Two Labor among Primiparous Women

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Abstract - This study determined the effectiveness of visual biofeedback in hastening stage II of labor between primiparous women administered with adjunct intervention and those who were not. A non-equivalent post-test design with twenty primiparous women distributed to both control and experimental groups chosen through purposive sampling. A 3 x 2 foot mirror to provide visual biofeedback (treatment), a stopwatch to measure the length of time elapsed from full cervical dilatation and effacement to the delivery of baby, and a tally sheet for recording of data were used in data gathering. Findings show that the control group (not subjected to mirror) obtained the mean of 18.92 (SD=7.17) while the experimental group (subjected to mirror) obtained a mean of 6.77 with a mean difference of 12.15 (SD=5.24). The computed t- test value is 4.37, which was greater than the table value of 2.23 tested at 0.05 level of significance. Results showed a significant difference in the duration of second stage of labor, thus, the use of mirror as a feedback mechanism during the second stage of labor reduces its duration.

INTRODUCTION

Since time immemorial, difficulty in bringing forth another human being has been one of the greatest apprehensions women have to confront themselves with. As exemplified by cases of infant mortality and incidence of death among mothers due to giving birth in such an alarming rate. It can be noted that techniques, in whatever form or design, to efficiently assist birthing process have become a prevalent trend.

In connection, this research study was conducted in the spirit of providing ample information on Visual Biofeedback: Adjunct Mirror Intervention During Second Stage of the Labor Process of Primiparous Women which is deemed to have a high probability in the improvement of assisted birthing process. Traditionally, Bradley method of delivery (“husband-coached childbirth” although the coach is not necessarily the husband of the woman), is employed as a conditioned stimulus using the sound of voice, use of particular words and repetition of practice in encouraging shorter delivery time. As compared to traditional coaching, visual biofeedback is used as an alternative technique that would ultimately answer the need to hasten the specified phase of the labor process. The use of a “reflection apparatus” or a mirror, aims to provide immediate visualization of the birthing progress thus encouraging correct bearing down by the mother consequently lessening the hard work. As a corollary, a significant change and difference can be noted in the delivery of a newborn. However, it is imperative to recognize the fact that the researchers formulated quantitative analysis to make the study well grounded and credible.

Biofeedback technique and its principle have been universally known. Not only has their contribution become very significant in science but also in ordinary daily activities. Citing one simple example is the task of combing the hair. By looking at the mirror, a person is guided on how to fix his hair. Visual stimulation is utilized in controlling and doing appropriate actions.

FRAMEWORK

Labor is traditionally divided into three stages: a first stage of dilatation, beginning with true labor contractions and ending when the cervix is fully dilated; a second stage, from the time of full dilatation until the infant is born;

and a third stage or the placental stage, from the time the infant is born until the delivery of the placenta.

With full dilatation of the cervix, which signifies the onset of the second stage of labor, the woman typically begins to bear down with the descent of the presenting part. Uterine contractions and accompanying expulsive forces may last 1 1/2 minutes and recur at times after a myometrial resting phase of no more than a minute. (Chapter IV: 314. Management of Normal Pregnancy. William's Obstetrics).

In most cases, bearing down is reflex and spontaneous in the second stage of labor, but occasionally the woman does not employ her expulsive forces to good advantage and coaching is desirable. Her legs should be half-flexed so that she can push with them against the mattress. Instructions should be to take a deep breath as soon as the next uterine contraction begins and with her breath held, exert a downward pressure exactly as though she were straining at stool. Usually, bearing down efforts are rewarded by increasing bulging of the perineum -- that is, by further descent of the fetal head. *The mother should be informed of such progress, for encouragement at this stage is very important.*

The median duration of the second stage (from complete dilatation of the cervix to delivery) is 50 minutes in nulliparas and 20 minutes in multiparas, but it can be highly variable. In a woman of higher parity with a stretched vagina and perineum, two or three expulsive efforts after the cervix is fully dilated may suffice to complete the delivery of the infant. Conversely, in a woman with a contracted pelvis or a large fetus, or with impaired expulsive efforts, the second stage of labor may be abnormally long. (Chapter IV: 314. Management of Normal Pregnancy. William's Obstetrics)

The present study is an attempt to develop a new means of hastening the stage II of the labor process. Visual Biofeedback is relatively noninvasive and practical, using a device (e.g. mirror) that provides immediate visualization of the birthing process. There are at least two reasons to expect that visual biofeedback may be used to assist patients during labor: First, therapies that incorporate sensory feedback provided by a clinician (e.g., EMG, spirometers, etc.) have reported substantial success. For example, two studies using electromyography (EMG) have recently explored biofeedback as a means of assessing and re-mediating movement disorders associated with focal brain damage (Bradley L, et al, 11-22). These findings suggest visual biofeedback could be used in obstetrics to promote correct "bearing down" techniques of a woman in labor to further expedite the birthing process.

Second, adjunct visual biofeedback therapy may offer several important features that cannot be found in the conventional, traditional methods. For example, in visually-guided biofeedback, when the patient generates appropriate motor behaviors, they are positively reinforced. The visual feedback stimuli and other non-verbal information is usually much faster and accurate than the clinician's comments. These considerations may be especially important for individuals having a primary difficulty in coordinating voluntary contractions during labor. With these considerations in mind, the researchers explored visual biofeedback as a means of expediting stage II of labor. Specifically, the researchers have looked into any significant change in length of time in the stage II of labor in patients employing the adjunct intervention.

This study is anchored on the growing body of evidence in other health sciences suggesting visual biofeedback can assist individuals in training by providing a graphic representation of physiological data and by facilitating awareness and a faster development of self-regulation (Wong AM, 322-7). Biofeedback is a technique intended to teach patients self-regulation of certain physiologic processes. The technique involves the feedback of a variety of types of information not normally available to the patient, followed by a concerted effort on the part of the patient to use this feedback to help alter the physiological process in some specific way.

Patient motivation plays a major factor in any therapy. Biofeedback therapy actively involves the patient in the therapy process, providing visual input that challenges and motivates the patient. Although biofeedback technique has been practiced in birthing centers throughout the United States, there had been limited documentation regarding the effectiveness of biofeedback in obstetrics. Nevertheless, the utilization of this intervention is well documented in other health fields. In physical therapy for example, the uses of biofeedback in treating certain conditions have been widely employed. As a tool for muscle re-education, electromyographic (EMG) muscle biofeedback measures the electrical activity created by muscle contractions. The goal of EMG biofeedback is to train subjects to increase, decrease, or stabilize muscle tension. Biofeedback is provided through proportional changes in a moving meter, bar graph, polygraph display, or an auditory tone. Training patients to increase EMG activity above a predetermined criterion is used clinically during muscle rehabilitation, where patients are encouraged to increase muscle activity of weak or flaccid limbs such as may result from a stroke or accident.

Another study conducted by Dr. Eric Altschuler and colleagues, from the University of California assessed whether a new mirror therapy can be used to help these patients regain movement in the limbs. Patients tried to move their hands or arms symmetrically while watching their good arm in the mirror. The said study reported that the mirror therapy provides patients with proper visual input because the reflection helps the patient think that their affected arm is moving correctly, hence stimulating the brain to help with nerve control of limb movement. The study suggested that this therapy may help to reverse elements of learned disuse of the affected limb.

Wong et al. (1997) chose 60 individuals with hemiplegia after stroke or traumatic brain injury and randomly divided them into the control or experimental group. All of the patients received therapy using a training table device intended to improve postural symmetry. The experimental group also received feedback about posture with the use of a mirror, while the control group did not receive any feedback. After 4 weeks of training, the group receiving feedback had a lower percentage of postural asymmetry.

In a more recent study under the guidance of Technol, researchers examined the effect of the use of a biofeedback device using a mirror in addition to physical therapy in training stroke patients with impaired sitting balance compared with outcome in patients receiving conventional physical therapy only. Biofeedback intervention, by providing visualization of postural trunk control, is a useful adjunct to conventional physical therapy in the rehabilitation of stroke patients with impaired sitting balance.

In another area of health care, real-time continuous visual biofeedback were employed in the treatment of speech breathing disorders following childhood traumatic brain injury (Murdoch, et al. p. 234-235). In this study, the efficacy of traditional and physiological biofeedback methods for modifying abnormal speech breathing patterns was investigated in a child with persistent dysarthria. The results of the study demonstrated that real-time continuous visual biofeedback techniques for modifying speech breathing patterns were not only effective, but superior to the traditional therapy techniques for modifying abnormal speech breathing patterns in a child with persistent dysarthria. These results show that physiological biofeedback techniques are potentially useful clinical tools for the remediation of speech breathing impairment in the paediatric dysarthric population.

Biofeedback has also been utilized for the treatment of stress and/or urge incontinence in cognitively intact patients who have failed a documented trial

of pelvic muscle exercise (PME) training. In this study, biofeedback was not a given as the main treatment, per se, but a tool to help patients learn how to perform PME. Biofeedback-assisted PME incorporates the use of an electronic or mechanical device to relay visual and/or auditory evidence of pelvic floor muscle tone, in order to improve awareness of pelvic floor musculature and to assist patients in the performance of PME. There has also been some interest in using biofeedback re-education to treat other musculoskeletal conditions including, but not limited to spasmodic torticollis, decreasing blepharospasm (involuntary eye blinking), bruxism, TMJ disorder and training to enhance retention in fecal and urinary incontinence.

However, in the study conducted by Bradley et al. (1998) the effects of electromyographic (EMG) biofeedback training on the recovery of gait in the acute phase (4 – 6 weeks) post stroke were examined. At follow-up, there was no difference in the rate of improvement between groups.

In 1996, Kohlmeyer set out to evaluate the effectiveness of biofeedback and electrical stimulation on the recovery of tenodesis grasp in tetraplegic individuals during the initial phase of acute rehabilitation. Based on the author's conclusion, biofeedback and electrical stimulation alone or in combination did not offer any advantages over conventional rehabilitation treatment of wrist extensors in tetraplegic patients after spinal cord injury.

With reference to the study conducted, 13 patients with post-stroke hemiplegia were enrolled to determine whether the addition of visual biofeedback/forceplate training could enhance the effects of other physical therapy interventions on balance and mobility following stroke. While both groups showed some improvement following the four weeks of physical therapy, no additional effects were demonstrated in the group that received visual biofeedback/ forceplate training in combination with other physical therapy.

While there have been different views regarding the value of biofeedback in other specializations, the researchers aim to establish its relevance in the field of maternal and obstetric nursing through this study.

SIGNIFICANCE OF THE STUDY

Biofeedback is a technique to reveal to human beings some of their internal physiological events, be they normal or abnormal, in the form of visual or auditory signals in order to teach them to manipulate these otherwise involuntary or unfelt events.

Visual biofeedback is a technique currently utilized in other fields of health care. This study will benefit the nursing profession as a whole in the sense that it will create an awareness of the feasibility of the use of visual biofeedback in the delivery room setting.

Incorporating visual biofeedback to the traditional intervention such as coaching would create less strenuous and consequently efficient delivery; thereby minimizing mother and child complications otherwise brought about by a prolonged labor process.

This study will benefit the primiparous women, as they are exposed to the availability of the option to use the suggested biofeedback technique during childbirth. Second, the unborn child in the mother's womb will have better chances of surviving the extra-uterine life since the said technique would foster lesser risk of complications such as hypoxia and meconium staining, infection and possible death.

Furthermore, the mother will experience less difficulty and stress as a corollary of a prolonged labor process. Also the delivery room staff will benefit by the shorter wait brought about by a shorter labor process.

OBJECTIVES OF THE STUDY

This study aims to determine the effectiveness of visual biofeedback in hastening stage II of labor between primiparous women administered with adjunct intervention and those who were not.

Specifically, this study sought to determine if there is a difference in the length of stage II of labor between the control and experimental groups.

SCOPE AND LIMITATION

This study focused on the effectiveness of using visual biofeedback as a new technique in hastening the stage II of the labor process. This study was conducted for 14 days.

The group of women studied were primiparous with no fetopelvic disproportion, no fetal malposition or malpresentation, no multiple pregnancy, and none treated with heavy sedation, oxytocin, or operative intervention; uterine contractions are regular and of adequate intensity, all had a normal pelvis and were at term with a vertex presentation and delivered averaged sized infants.

The constraint of the study involved the unpredictability in the number of deliveries by primiparous women at the Cebu City Medical Center which translated to low sample population.

HYPOTHESIS

There is no difference in the length of stage II of labor between the control and experimental groups.

MATERIALS AND METHODS

RESEARCH LOCALE

Subject selection and data collection took place at Cebu City Medical Center (CCMC) located at Panganiban Street corner N. Bacalso Avenue, Cebu City. This public hospital, catering to the needs of Cebu City residents, houses a delivery room which offers services to pregnant women belonging to the lower socio-economic bracket. This facility was chosen as the place to conduct this research due to its high number of referrals and admissions.

The labor and delivery room are located at the right wing of the second floor adjacent to OB ward. The labor room, consisting of 2 adjoining quarters, houses 5 beds that can accommodate as many as 10-15 clients. The delivery room is suited to handle two simultaneous deliveries.

RESEARCH DESIGN

This quasi-experimental study, with a control group, tested the effectiveness of employing biofeedback among primipara clients undergoing stage II labor. No randomization was done in obtaining sample population.

Non-equivalent post-test only design was employed in measuring the effectiveness of the intervention administered.

RESEARCH SAMPLE

The target population included 20 primiparous women undergoing the second stage of the labor process. The second stage of labor starts from full cervical dilatation and effacement to delivery of the baby. A purposive sampling of women meeting the inclusion criteria was done. A sample of 20 had the capability of providing preliminary evidence as to the effectiveness of the intervention given to the experimental group.

RESEARCH INSTRUMENTS

This quasi experimental research utilized the following instruments: a 3 x 2 foot mirror to provide visual biofeedback (treatment), a stopwatch to measure the length of time elapsed from full cervical dilatation and effacement to the delivery of baby, and a tally sheet for recording of data. Direct observation was employed throughout the course of the experiment.

RESEARCH PROCEDURE

A.1 PREPARATORY STAGE

Ethical approval was secured from the institution where the study is to be conducted.

A.2 IDENTIFICATION OF RESEARCH SAMPLES

A purposive sampling plan was utilized to select target population in two groups of equal size. Inclusion criteria required that clients are primiparous and are planning to deliver via normal spontaneous vaginal delivery (NSVD). The clients selected represented a variety of ages, socio-economic status, and educational levels in the general community. After the pre-interview, the population sample was established. The first 10 clients were considered as the experimental group (administered with mirror intervention), while the next 10 clients were designated under the control group (conventional only). Signed informed consent was obtained from all intervention participants prior to the experiment.

B. ADMINISTRATION OF TREATMENT

Once clients have achieved full cervical dilatation and effacement per doctor's confirmation, administration of the treatment will be initiated. This research utilized a 3 x 2 foot mirror held overhead and directed towards the perineum providing the client a full view of the progress of the entire birthing process.

C. DATA COLLECTION

The length of the stage II of labor of both groups as measured from the time of full cervical dilatation and effacement to delivery of the baby was

noted using a stopwatch. Data was then recorded using a tally sheet.

D. DATA COLLATION AND STATISTICAL TREATMENT

Collected data was analyzed statistically using t-test of mean difference to determine the significant disparity between the two groups. Statistical results were interpreted and documented.

RESULTS AND DISCUSSIONS

The table shows that the control group obtained the mean of 18.923 while the experimental group obtained a mean of 6.774 with a mean difference of 12.149. The standard deviation of the control group is 7.166 while 5.240 for the experimental group. The computed t- test value is 4.37, which was greater than the table value of 2.228 tested at 0.05 level of significance two tailed. Thus, the null hypothesis of no significance is rejected. The rejection of the null hypothesis implies that there is a remarkable decrease in length of stage II labor process.

Table 1. Summary table of the duration of stage II labor
of the control and experimental groups

SUBJECTS	CONTROL GROUP Duration of Stage II Labor in Minutes	EXPERIMENTAL GROUP Duration of Stage II Labor in Minutes
1	25.08	3.50
2	24.08	6.47
3	25.93	20.83
4	26.25	3.83
5	14.15	10.30
6	24.50	8.17
7	10.23	4.67
8	10.40	1.95
9	21.43	4.30
10	7.18	3.72

Table 2. Summary table of the significant difference of the duration of stage II labor of the control and experimental groups

Group	X	SD	Mean difference	t-test value	Remarks
Control	18.923	7.166	12.149	4.33	Reject H_0
Experimental	6.774	5.240			

The researchers sought to investigate whether there is a significant difference between the duration of stage II labor process of the control group and the experimental group that employed the adjunct mirror intervention.

The individual duration of stage II labor of the control and experimental groups were tabulated accordingly in Table 1. By simple observation of the study's results, one could readily note the apparent difference in the length of the labor process (Stage II) between the samples from both groups. Statistical treatment using t-test of mean difference further reinforced this observation as evident in Table 2. The data gathered from the experiment consistently showed a marked variation in the duration. Although this study used a small population size, it provided ample evidence regarding the effectiveness of the said intervention applied in the field of maternal and child nursing. The results established that the use of visual feedback in maternal nursing is as effective as used in other disciplines as proposed by the study conducted under the guidance of Technol, wherein there was a significant effect with the use of visual feedback using the mirror in stroke patients with impaired sitting balance compared with the outcome in patients receiving conventional physical therapy.

The outcome of the study was further supported by the works of Dr. Eric Altschuler, et al. which assessed the use of new mirror therapy in helping patients regain movement in the limbs. The said study reported that the mirror therapy provides patients with proper visual input because the reflection helps the patient think that their affected arm is moving correctly, hence stimulating the brain to help with nerve control of limb movement.

Biofeedback used in this study employed the same modality and principle applied in other sciences. As reflected in the study, the visual feedback provided by the mirror becomes an immediate and continuous source of

visualization of the birthing process thus affirming the mother's correct effort of "bearing down" resulting to ease of delivery hence, shortening the duration in stage II of labor.

Based on the results of this study, the researchers affirm the findings of previous studies adopted by other health sciences that visual feedback is indeed a useful tool in monitoring patients with motor performance through the use of sensory modalities, in this case, visual feedback to reinforce correct motor behavior.

CONCLUSION

Based on the findings of the study, utilization of a mirror as an instrument in providing visual feedback to the mothers on the second stage of labor reduces the length of this stage providing an effective adjunct intervention

RECOMMENDATIONS

This study provides preliminary evidence as to the effectiveness of the visual feedback: adjunct mirror intervention in hastening stage II labor among Primiparous women.

The future researchers shall conduct a more comprehensive study using a bigger sample size that is representative of the whole population and taking into consideration other factors like weight, socio-economic status, activity level during pregnancy, diet, life-style, obstetric and healthy history of mother. This research will also serve as a reference guide for future related studies.

Health institutions and health professionals rendering obstetric care must become aware of the relevance of this study and apply the proposed technique in their pursuit of continuous development of their services.

This research will also serve as a reference guide for future related studies.

NOTE:

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