

High Variance in Pupillary Examination Findings Among Postanesthesia Care Unit Nurses

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Purpose: On arrival to the postanesthesia care unit (PACU), patients are observed closely for significant neurological status changes. In particular, patients require frequent neurological examinations, which include assessment of the pupils for changes and/or abnormalities.

Design: This is a prospective, nonrandomized, observational study to examine the findings of pupillary examinations by nurses using different light sources in patients with existing pupillary assessments as ordered by standard of care.

Methods: PACU nurses were asked to perform their pupillary assessments using either a penlight with a gauge or a penlight without a gauge. Assessments were completed on the same patient within 5 minutes of one another, and results were compared.

Findings: PACU nurses using the same penlight with a gauge had more consistent results than those using different penlights without a gauge.

Conclusions: Pupil assessments should be done with standardized light source.

Keywords: pupillary examination, nursing, neurosurgery, PACU.

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DURING THE IMMEDIATE POSTOPERATIVE PERIOD, patients admitted to the postanesthesia care unit (PACU) require close observation and monitoring because they are a higher risk for complications associated with recovering from the effects of anesthesia.¹ One element of close observation is the pupillary examination (pupil exam), especially for postoperative neurosurgical patients. Changes in a patient's pupil exam could indicate a

neurological change during emergence from anesthesia.² This may result in a longer PACU stay or the need for additional follow-up care (eg, CT - computed tomography scan).

The practice surrounding pupil exams is not entirely uniform. Nurses with different practice backgrounds perform pupil exams under different levels of light, often using different light sources. It is not known if these differences are linked to variances in pupil findings. The above factors bring to question the reliability of the penlights nurses use in performing pupil exams in the PACU. The purpose of this study was to examine whether variances in light sources impact the findings of pupil exams. This study will specifically examine the following question: When two nurses perform pupil exams using the same style of light source compared to two nurses using two different styles of light source, are the pupil exam findings less consistent? Comparing results of assessments performed using

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a standard penlight gauge versus any light source can provide data on safer patient care.

Background

The American Society of Postanesthesia Nurses has developed standards of care for nurses who provide care for patients following surgical procedures. In general, nurses are required to observe the patient closely for any neurological and/or vital sign(s) changes until patients achieve an appropriate discharge score before release from the PACU.¹ The frequency of pupil checks may also be driven by orders, hospital protocols, and nurses' discretion based on patient condition and type of procedure. Accurate pupil assessments are important because they provide immediate information regarding the status of the brain.³

Pupil Exam

Pupil reactivity is an indicator of neurological status or a response to sedative/analgesic medications.⁴ Pupil size is affected by the amount of light in a room, the level of patient consciousness, and patient age.⁵ Pupil exams are conducted on admission to the PACU. Subsequent neurological examinations are conducted 30 minutes after admission, then hourly, until the patient is discharged from the PACU. Every nurse in the PACU performs pupil examinations; therefore, it is not uncommon to have more than one nurse examine the pupils of any given patient, which provides the opportunity for variance in technique and pupil readings.

Nurses typically evaluate three components of the pupil: size, shape, and reactivity. Size is measured or estimated in millimeters. Shape is graded as round, pinpoint, or irregular. Reactivity evaluates the ability of the optic nerve to conduct the impulse and is most typically graded as nonreactive, sluggish, or brisk.⁶

Light Source

Pupil reactivity is a valuable diagnostic method used mainly for evaluation of neurological function and the visual system. However, the reactivity of abnormally constricted or "pinpoint" pupils may be difficult to ascertain, especially in a room with bright lights (eg, PACU). Furthermore, patients who arrive in PACU from the operating room

may be under the influence of anesthetics and opioids (eg, morphine or neostigmine that constricts pupils),⁷ and therefore may have pinpoint pupils. This makes the pupil reactivity assessment in PACU patients challenging.

Historically, nurses were provided with flashlights or penlights by the hospital to help with the assessment of pupil reactivity. However, flashlights and penlights are not standardized, and different types emit different levels of light, which may affect the reactivity of the patient's pupils and/or the ability of the nurse to determine the pupil reactivity of the patient. There are penlights with gauges to help control the light levels being emitted. These types of penlights are not made available to all nursing staff, which results in every provider using nonstandardized penlights to assess pupil reactivity.

The expectation that a more standardized instrument for assessing pupil reactivity would be useful to nurses and others delivering patient care in PACU is reasonable; but this has not been demonstrated. A study of physician pupil assessments found substantially significant agreement in results across physicians when they used a standardized tool to determine pupil reactivity, versus when measurements were subjective.⁸ The purpose of this study was to examine the nurse's ability to determine if pupil assessments using a penlight with a gauge are different from using a penlight without a gauge. This may lead to a standardized protocol as to what type of penlights to use to assess pupils.

Ambient Light

Pupil sizes tend to increase in low light and decrease in bright lighting.^{5,9} When assessing pupil reactivity, the lights in most PACUs are never turned off, and the patients are almost always supine facing bright lights. Furthermore, they have pinpoint gaze on arrival. These three factors make assessing pupil size, shape, and reactivity more difficult and the results more variable from nurse to nurse.

Design

This is a prospective, nonrandomized, observational study to examine the findings of pupil exams by nurses using different light sources in patients with existing pupillary assessments as ordered by

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