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Face and content validation of Phacoemulsification Techniques Related To Surgically Induced Astigmatism questionnaire

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ABSTRACT

Phacoemulsification surgical techniques are associated with surgically induced astigmatism (SIA) in post-cataract surgery. However, no established tool is currently available to gather information on the surgeon's phacoemulsification techniques. This study aimed to validate a newly developed 'Phacoemulsification Techniques Related to Surgically Induced Astigmatism' (PTechSIA) questionnaire. PTechSIA questionnaire was designed to collect information on surgical techniques used by surgeons during phacoemulsification. Questionnaire items were generated based on peer-reviewed literature of related domains to phacoemulsification surgical techniques. The self-administered tool consisted of fifteen close-ended questions. Ten subject-matter experts (SMEs) were recruited for face validation using qualitative approach and content validation using Lawshe's method. The items in the questionnaire were modified based on feedback from the SMEs. Content validation ratio (CVR) was calculated for each item; items with CVR value of less than 1.00 were eliminated, and the final content validity index (CVI) of the questionnaire was obtained. Out of fifteen items, six items with CVR value of less than 1.00 were eliminated (items number 2, 7, 11, 13, 14, 15) with initial CVI of 0.61. After the modification process, the number of final items was nine, with an overall final CVI score of 1.00. Overall, the finalised PTechSIA questionnaire achieved appropriate validity. Hence, the findings indicate that the PTechSIA questionnaire can be utilized for future assessments of surgical techniques and their association with SIA.

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INTRODUCTION

A qualified measuring tool is defined by the reliability and validity of the measures. A researcher must evaluate the validity of an assessment tool before its implementation (Mohamed *et al.*, 2017) in order

to minimise measurement errors (Gilbert and Prion, 2016) . Content validation of a measuring tool is referred to as the extent of the tool which covers all the domains being studied. The contents should be extracted from literature, and suggestions were made and evaluated by at least three subject-matter experts (SMEs) (Lynn, 1986).

Surgically induced astigmatism (SIA) in post phacoemulsification cataract surgery is determined by the surgical techniques. Several surgical techniques associated with SIA had been discussed in previous studies (Kawahara *et al.*, 2013; Kwon *et al.*, 2014; Chang *et al.*, 2015; Nikose *et al.*, 2018) . Other factors such as the location and size of the main incision are also frequently reported as significant factors that are related to the SIA, although not regularly documented in surgical notes. There are also other surgical techniques which are often neglected; these include hand dominance, microkeratome design, as well as design and type of incisions which are possibly associated with SIA.

Although there were several researches conducted about the surgical techniques related to SIA, no specific tool was developed in documenting all the surgical techniques used in phacoemulsification. Hence, it is necessary to have a reliable and validated questionnaire for this purpose.

MATERIALS AND METHODS

This study obtained ethical approval from the International Islamic University Malaysia (IIUM) Research Ethical Committee (Reference Number: IREC 2018-65).

Tool Development

The tool was initially developed based on peer-reviewed literature. The first items included several domains of phacoemulsification techniques which were related to SIA. The domains were 1) the main incision, 2) the side port incision, 3) the position of surgeon, 4) the phacoemulsification technique, and 5) the experience of the surgeon (Kawahara *et al.*, 2013; Yoon *et al.*, 2013; Theodoulidou *et al.*, 2015) .

Face and Content Validation

Ten subject-matter experts (SMEs) who are qualified Ophthalmologists from the Ministry of Health, Malaysia (n = 10) participated in this study. Five SMEs were involved in face validation, whereby the other five were involved in content validation. Each SME was given a copy of the questionnaire with a research information sheet and consent form. The purposes, benefits, risks and procedures of this study were briefly explained to all SMEs.

Face Validity

Face validation is a process in which the target group rates a test item, whether it is relevant or does not fit its purpose (Devon *et al.*, 2007) . A qualitative approach was used to conduct a face validity assessment (Sangoseni *et al.*, 2013; Abootalebi *et al.*, 2016) The five SMEs assessed each item in the questionnaire thoroughly by looking at the style and format consistency, language clarity and readability, (Devon *et al.*, 2007) , sentence syntax and practicality, and suitability of terminologies used. The SMEs also provided feedback on the difficulties and ambiguities encountered while filling out the questionnaire. Self-administered responses were recorded directly in the "comment/suggestion" section of the questionnaire.

Content Validity Ratio and Content Validity Index

Content validity ratio (CVR) was evaluated using Lawshe's method. The CVR is an established statistical method to determine the content validity of individual items by retaining or rejecting the items (Wilson *et al.*, 2012) using the following equation:

$$\text{CVR} = (n_e - N/2) \div (N/2)$$

n_e = a number of SMEs rating a measurement item as "essential".

N = the total number of SMEs who are involved in the content validity process.

The CVR value ranges from -1.00 to 1.00. Scores of 0.00 to 0.99 indicates that more than half but less than all SMEs rated an item as "essential" while rating 1.00 suggests that all of SMEs rated a thing as "essential". A negative CVR value indicates that more than half of SMEs did not rate the items as "essential". The decision on item acceptance was based on Lawshe's table (Lawshe, 1975) containing threshold values, in which only the items with CVR above the threshold value would be accepted. Lawshe's threshold value is different depending on the number of SMEs involved. For this current study, which recruited five SMEs, the threshold CVR value was 0.99. In other words, it requires all SMEs to agree that an item is considered "essential" for it to be accepted in the final tool.

Content validity of the entire questionnaire was evaluated using the content validity index (CVI). The CVI is the mean of CVR values of all individual items. CVI value of more than 0.80 shows good content validity of the overall questionnaire (Davis, 1992) .

RESULTS AND DISCUSSION

SIA has been emphasized in previous studies as it leads to better visual performance and satis-

Table 1: Content validation assessment

Domains	Item Number	Items	CVR	Decision
Main incision	1	Which one is your dominant hand?	1.00	Accept
	3	What is your main incision architecture?	0.50	Reject
	4	What is the type of the main incision that you frequently perform?	1.00	Accept
	6	What is the size of your main incision?	1.00	Accept
	7	Do you measure the size of the main incision?	0.50	Reject
	8	Where is the location of your main incision?	1.00	Accept
	9	Do you have any specific microkeratome design in performing the main incision?	1.00	Accept
Side port incision	10	How many side port incision(s) do you perform?	1.00	Accept
	11	What is the size of your side port incision(s)?	0.50	Reject
	12	Where is the location of your side port incision(s) in relative to the main incision?	1.00	Accept
	13	Do you mark the side port incision(s) location before surgery?	0.00	Reject
	14	Do you use any specific microkeratome design in performing the side port incision(s)?	0.50	Reject
Surgeon's position	2	Where do you position yourself during the surgery?	0.50	Reject
Phacoemulsification technique	5	What is the surgical technique that you apply?	1.00	Accept
Surgeon's experience	15	How many phacoemulsification cataract surgery cases that you have performed?	0.50	Reject

CVR - Content validation ratio

faction in post-cataract surgery (Gundersen and Potvin, 2016; Srivannaboon and Chirapapaisan, 2017; Clark, 2018) . The surgical technique is an established factor that influences SIA (Kawahara *et al.*, 2013; Kwon *et al.*, 2014; Chang *et al.*, 2015; Nikose *et al.*, 2018) . However, incomplete information on surgical techniques in operative notes could hinder retrospective studies of SIA. It is suggested that surgical operation notes must have detailed surgery procedures, all operative findings and postoperative instructions to enable continuity of care by other ophthalmic surgeons. Therefore, the patient's operation note should be completed and legible for future readers (Payne *et al.*, 2011) . As to date, there are no standardized templates for operation notes related to SIA that have been published. This current PTechSIA questionnaire was aimed to be an initial milestone towards comprehensive and

legitimate documentation as a solution to the missing essential surgical information. To initiate the process, fifteen items were generated which consisted of seven items for the main incision domain, five items for the side port incision domain, and one item for the position of surgeon, phacoemulsification technique and surgeon's experience domains, respectively. Subsequently, the first fifteen items underwent face and content validation processes by SMEs before being used in clinical or research settings.

The purpose of validation exercise is to identify any unrelated items that do not fit the studied domain and to amend the items for improvement (Lynn, 1986) . In this current study, face and content validation were performed to identify and filter the non-fit items. Several conflicting reports were found in previous studies regarding the definition and assessment method of face validity (Cook and Beckman, 2006; Bölenius *et al.*, 2012). There was no consensus on the status, role and importance in executing face validity assessment. However, we believed that face validity is an important test to confirm the tool appropriateness, comprehension and measures the questionnaire objectives (Bölenius *et al.*, 2012) . We conducted a qualitative approach in the face validity process in accordance with several previous works (Sangoseni *et al.*, 2013; Abootalebi *et al.*, 2016) . We found that the qualitative approach enables SMEs to provide subjective analysis for each item and give their expert opinion for the improvement of the questionnaire.

Modifications of the questionnaire were performed according to the suggestions given by SMEs. The modified version of the questionnaire underwent further content validation process. There are several approaches in content validation, as explained in previous literature (Lawshe, 1975; Polit *et al.*, 2007; Gilbert and Prion, 2016) . Lawshe's method was chosen in this current study due to its wide acceptance and simplicity (Ayre and Scally, 2014) . Due to the absence of reports on ways to calculate original critical values, later studies have attempted to revise the critical value of Lawshe's CVR (Wilson *et al.*, 2012; Ayre and Scally, 2014) , which revealed anomalous values in the original Lawshe's CVR critical value. However, the anomaly does not affect the stringency of the value, and it is a safe method to use in deciding the inclusion of items (Wilson *et al.*, 2012) . In this current study, the revised critical values of the five SMEs were similar between the original and revised versions. Therefore, it can be confirmed that the accepted items were appropriately content validated. The assessment summary is displayed in Table 1 .

Overall CVI score of the questionnaire with all fifteen items was 0.61. Then, the following six items (items number 2, 7, 11, 13, 14, 15) with CVRs of less than 0.99 were excluded from the questionnaire. After modification of the questionnaire by retaining nine items, the overall final CVI score of 1.00 was obtained. Previous literature outlined that CVI value of more than 0.80 indicates good agreement (Davis, 1992) and 1.00 represents a perfect agreement between SMEs (Lynn, 1986). This proves that content validity for the entire questionnaire is acceptable where all the SMEs achieved consensus in their assessments.

CONCLUSIONS

Proper validation processes are crucial in the development of a questionnaire as a research and clinical tool. In this research, the PTechSIA questionnaire has passed through a proper face and content validity processes. To the best of our knowledge, there is no published tool related to SIA currently available. Therefore, the PTechSIA questionnaire can be utilized in the near future to assess surgical techniques and their association with SIA. Moreover, it could benefit clinician and researcher who intend to perform a further investigation of the association of surgical techniques and SIA.

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