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# A validation study of the Bahasa Malaysia version of the National Institute of Health Stroke Scale

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### Abstract

*Background & Objectives:* The National Institute of Health Stroke Scale (NIHSS) provides a valid and quick assessment of stroke severity in hyperacute stroke management. Stroke patients who are eligible for reperfusion therapy require prompt assessment. There is no validated Bahasa Malaysia (BM) version of the NIHSS that allows easier assessment by BM-speaking health professionals.
This study aimed to translate and validate a BM version of the NIHSS. *Methods:* The English NIHSS was translated to BM, then back translated to ensure linguistic accuracy. We also adapted the language assessment of the NIHSS to be more culturally appropriate. Training and certification videos were downloaded from the NIH website and dubbed into BM. We determined intra-class correlation and unweighted kappa as the best measure of reliability. Median scores were used in the analysis for language items. *Results:* One hundred and one raters participated in the test-retest reliability study. Agreement between the original NIHSS and our translated version of the BM-NIHSS was good (ICC = 0.738, 95% CI: 0.611 to 0.823). Fair to moderate agreement was found on item-by-item analysis (unweighted $\kappa$=0.20-0.50) despite high observed agreement. Fifty patients participated in the language assessment arm. Scores were better in BM for reading, naming objects and repetition (Mdn = 100, $p < 0.001$). There was no difference in the median scores for the description component.
*Conclusions:* The BM-NIHSS is a valid translation of the NIHSS, and may be used in clinical practice by BM-speaking healthcare professionals.

*Keywords:* NIHSS, stroke, Bahasa Malaysia, validation

## INTRODUCTION

Stroke is a major health concern due to the increasing prevalence of vascular risk factors and the aging population. Stroke is the second commonest cause of death and the third leading cause of disability worldwide.[1] In Malaysia, the percentage of deaths attributed to stroke ranges from 6.6% to 8.4%. Based on life expectancy of 72 and 76 years for males and females respectively, this averages to 5.5 crude deaths per 1000 population.[2]

Standard management of stroke includes thrombolysis using recombinant tissue plasminogen activator (rtPA). The management of stroke is increasingly described as hyperacute and consists of thrombolysis alone or in combination with mechanical thrombectomy. Reperfusion with rtPA is best achieved within 4.5 hours of stroke onset, with earlier intervention resulting in better outcome.[3,4] In cases of proximal arterial occlusion of the anterior circulation, a combination of rtPA and mechanical thrombectomy is beneficial if intervention occurs within 6 hours.[5-7]

Patients eligible for hyperacute therapy must be assessed quickly. Potential shortcomings include pre-hospital and in-hospital delays. Clinical assessment of stroke severity is a potential cause

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of delay, especially if healthcare professionals are inadequately trained or are not confident using the standard assessment tool. Clinical severity of stroke is determined using the National Institute of Health Stroke Scale (NIHSS). The NIHSS is a 15-item stroke scale, initially developed to standardize stroke assessment in the NINDS thrombolysis trial.[4,8]

The NIHSS has been translated into multiple languages.[9-13] but there is currently no validated Bahasa Malaysia (BM) version. The NIHSS is still used in its original form in Malaysia. While many healthcare professionals in the country have a competent command of English, BM remains the lingua franca of our multiracial society. We, therefore, initiated a translation of the NIHSS to BM and conducted a validation of the BM-NIHSS.

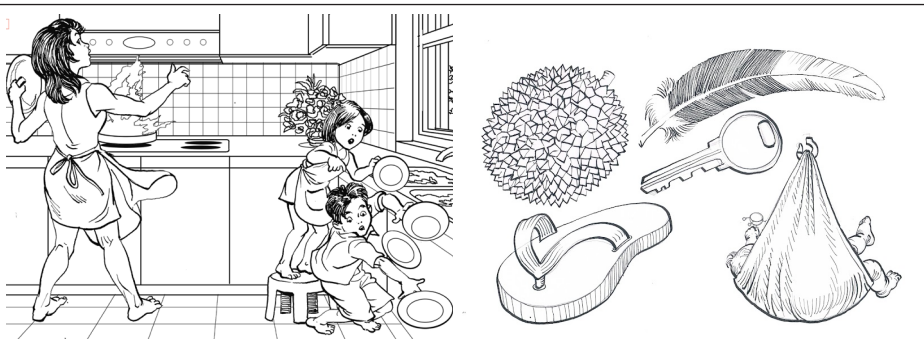
The need for quick and reliable assessment is crucial to expedite reperfusion therapy. By creating a BM-NIHSS, we hope that use of the scale will be more widespread among healthcare professionals. An accurate NIHSS assessment is an important part of successful acute stroke management.

## METHODS

We conducted an adaptation and validation of the BM-NIHSS at the UKM Medical Centre (UKMMC) in Kuala Lumpur, Malaysia. The study was approved by the institution's Human Research and Ethics Committee. (Approval code: FF2014-433)

The NIHSS was professionally translated from English to BM and then back translated to English to establish the linguistic integrity and accuracy of the translated version. One of the researchers (NK), who is bilingual, checked the translated version for errors as the translators were from a non-medical background. Permission was obtained from the copyright holder, the National Institute of Health, through HealthCarePoint (HCP).

The language assessment component of the NIHSS (items 9 and 10) consists of words, sentences, line drawings of objects and a scene (Boston cookie theft) that the patient is required to repeat, read and describe, respectively. A group of speech therapists assisted in translating the sentences and substituting new words in BM. The sentences were matched in terms of the number of syllables and the words devised took into account the various vowels and consonants that were tested in English. The original illustrations to evaluate aphasia were changed to objects that are more culturally appropriate. We also substituted the Boston cookie theft picture via the assistance of a professional illustrator. The language assessment of the BM-NIHSS is shown in Figure 1.



| | |
|---|---|
| **Awak kan tau.** | **MAMA** |
| **Rasa rendah diri.** | **LIP-LAP** |
| **Saya balik rumah.** | **TINGGI-TINGGI** |
| **Atas meja dalam bilik.** | **CUACA** |
| **Mereka nampak dia dalam tv.** | **PERTUNJUKAN** |
| | **STESEN KERETAPI** |

Figure 1. Language assessments of the BM-NIHSS

*Pilot phase*

The BM-NIHSS was initially tested on twenty paramedics in a pilot study. The pilot study was conducted to determine if the BM-NIHSS could be understood and applied as intended. Based on the feedback received, minor changes were made to sentence structure in some parts of the BM-NIHSS. No major revisions were required. The BM-NIHSS is in the appendix.

*Validation phase*

The validation process was conducted on two groups. Both groups reported that they had a working knowledge of English and BM. The first group consisted of medical personnel who tested all aspects of the BM-NIHSS excluding the language component while the second group, consisting of stroke patients, only assessed the language component of the BM-NIHSS. To distinguish between the two groups, we used the terms 'raters' for the first group and 'respondents' for the second. We adopted this approach because we rationalized that the language assessment is patient-centric while the other parts of the NIHSS are user-centric. This approach of testing the language component of a translation of the NIHSS on patients, was also used in validating the Hindi version of the NIHSS (HV-NIHSS).[10]

We obtained the permission from the copyright owner of NIHSS to use their on-line training videos. We dubbed two videos (one training and one assessment video) into BM.

One hundred and one raters (doctors and paramedics) were recruited and participated in the NIHSS certification test. The raters were divided into two groups. All raters were first shown an NIHSS training video in BM and then tested using the same NIHSS assessment videos in English and BM. The first group of 50 raters performed the test in English, followed by BM with a delay between tests of approximately 25 minutes. The second group attempted the BM version first followed by the English with a similar time delay between tests. The entire process from translation to validation is shown in Diagram 1.

The test-retest reliability was preserved by introducing the difference in order of tests between rater groups and the time delay between tests to reduce learning bias. Raters were not told if their responses during the assessment was correct.

The primary outcome was to measure how well-matched the results of the English and BM-NIHSS were. We compared the total score of the NIHSS and BM-NIHSS and intra-rater agreement was quantified using intra-class correlation (ICC).

For the ICC, values less than 0.5 indicate poor reliability, values between 0.5 and 0.75, and those from 0.75 and 0.9 are considered indicators of moderate and good reliability, respectively. Values greater than 0.9 indicate excellent reliability.[14] We also compared the individual items of the NIHSS using unweighted kappa correlations for item-by-item agreement analysis. As a guide, interpretation of kappa is shown in Table 1.

For the second group, we recruited 50 patients with stroke or transient ischemic attack (TIA) to assess the language component of the NIHSS. The primary outcome was a comparison of the median score of the two language versions of the NIHSS. The assessment of language in the NIHSS is subjective and at the discretion of the assessor.[15] For validating our translation, we required an objective method of assessment. Therefore, we used a scoring system to determine how well the respondents performed the test. The respondents' answers for each part of the language assessment (reading, repetition, naming and description of the scene) were assigned a score and converted to percentages. The scores in both language versions were then compared. The language assessment was conducted by a single assessor to reduce bias. As with the rater group, measures were taken in the respondent group to reduce learning bias with the English and BM versions tested alternately. We also asked respondents to provide feedback on how appropriate they felt the words, sentences and illustrations were.

## RESULTS

*Raters*

We demonstrated a strong overall agreement between the original version of the NIHSS and our translated version of the BM-NIHSS (ICC = 0.738, 95% CI: 0.611 to 0.823). The ICC value

**Table 1: Interpretation of Kappa[19]**

| | |
|---|---|
| <0 | Less than chance agreement |
| 0.01 - 0.20 | Slight agreement |
| 0.21 - 0.40 | Fair agreement |
| 0.41 - 0.60 | Moderate agreement |
| 0.61 - 0.80 | Substantial agreement |
| 0.81 - 0.99 | Almost perfect agreement |

was marginally less than 0.75 but the confidence interval was narrow, suggesting that scores between the two versions amongst our respondents did not vary greatly.

Of the 101 raters, 75 were paramedics and 26 were doctors, and all reported that they were bilingual in English and BM. The total NIHSS scores for both versions were not normally distributed and non-parametric testing was performed. The median score for BM-NIHSS was 75.84 and English was 75.00 (BM *Mdn* = 75.84, English *Mdn* = 75.00). Using the Wilcoxon-Signed Ranks Test, the difference in the median BM-NIHSS and NIHSS scores was not statistically significant ($Z = 0.534$, $p = 0.594$, $r = 0.05$). How well the two groups fared is illustrated in Figure 2.

We also compared the score differences between doctors and paramedics to determine how well each group performed. The doctor to paramedic ratio was 1:3 (26 doctors, 75 paramedics). Median scores for doctors were higher (BM-NIHSS= 80.77, NIHSS= 84.62) compared to paramedics; (BM-NIHSS= 76.92, NIHSS= 76.92). We used the Mann-Whitney U test to compare median scores and the difference was statistically significant (English score, $U = 436$, $p < 0.01$, $r = 0.48$) (BM score $U = 677$, $p < 0.05$, $r = 0.24$). Our results indicate that doctors do better in the NIHSS regardless of which version was used.

Table 2 represents a tabulation of the computed kappa score and probability value for individual items of the NIHSS, excluding the language assessment. The raw agreement (column 3) was defined as the percentage of raters agreeing on the same answers for both language versions regardless of the answer being right or wrong. The percentage of raters who were correct in certifying presence or absence of signs based on their assessment of the NIHSS video is shown in column 4.

Overall, there were four items where kappa scores were poor, (1A-loss of consciousness, 1C-loss of consciousness; commands, 2-gaze, and 5-motor arm left) despite the high percentage of observed agreement. This happens when there is no abnormality demonstrated for that particular item. For these items, the absolute value or percentage may be a more meaningful measure of concordance rather than the kappa score.[16,17]

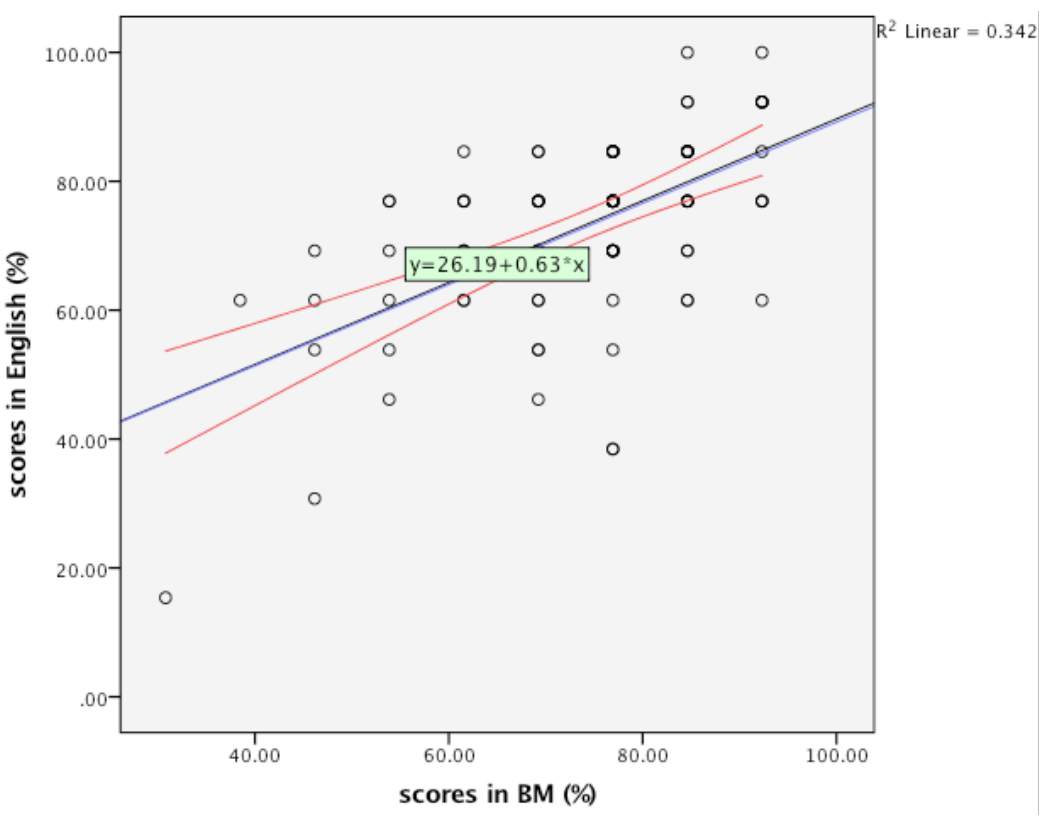



Figure 2. Scatterplot showing concordance between English and BM-NIHSS scores

**Table 2: Intra-rater agreement of BM-NIHSS**

| Item | Kappa | | *Raw agreement (%) | Correct answer (%) N= 101 | *P* |
|---|---|---|---|---|---|
| **Loss of consciousness (1A)** | poor | -0.013 | 97.03 (98) | 97.03 (98) | 0.886 |
| **LOC questions (1B)** | moderate | 0.494 | 67.00 (67) | 24.75 (25) | 0.000 |
| **LOC commands (1C)** | slight | 0.108 | 87.13 (88) | 86.14 (87) | 0.111 |
| **Gaze (2)** | slight | 0.154 | 81.19 (82) | 78.22 (79) | 0.075 |
| **Visual fields (3)** | fair | 0.321 | 86.00 (86) | 81.19 (82) | 0.000 |
| **Facial paresis (4)** | moderate | 0.419 | 70.00 (70) | 38.61 (39) | 0.000 |
| **Motor arm left (5A)** | slight | 0.130 | 89.89 (89) | 88.12 (89) | 0.078 |
| **Motor arm right (5B)** | fair | 0.261 | 60.42 (58) | 34.65 (35) | 0.004 |
| **Motor leg left (6A)** | fair | 0.307 | 89.00 (89) | 85.15 (86) | 0.000 |
| **Motor leg right (6B)** | moderate | 0.460 | 85.1 (80) | 71.29 (72) | 0.000 |
| **Limb ataxia (7)** | moderate | 0.402 | 70.00 (70) | 08.91 (9) | 0.000 |
| **Sensory (8)** | fair | 0.228 | 77.78 (77) | 71.23 (71) | 0.000 |
| **Hemi-neglect (11)** | fair | 0.339 | 81.19 (82) | 74.26 (75) | 0.000 |

*raw agreement can be positive or negative which is the total sum value for raters agreeing on correct and incorrect answers

*Respondents*

The 50 respondents ranged in age from 30 to 83 years (median age 69.5). All respondents reported that they were bilingual and the median duration of formal education was 9 years. We compared the median percentage scores of the four parts of the language assessment (repetition, reading, description of objects and scene) of the BM-NIHSS and NIHSS. The scores were compared using the Wilcoxon Signed-rank test. For repetition, reading and naming objects, respondents had significantly higher scores for the BM-NIHSS. In describing the scene, the median score was higher for the NIHSS but the difference was not statistically significant. All respondents stated a preference for the BM-NIHSS language assessment, in particular the objects they were asked to describe and the list of words for repetition. The results of the language assessment are shown in Table 3.

**Table 3: Respondent's scores for language assessment**

| | Median | *Z* | *p* |
|---|---|---|---|
| Malay scene<br>English scene | 66.66<br>74.95 | 1.22 | 0.222 |
| English reading<br>Malay reading | 70.00<br>100.00 | 3.50 | <0.001 |
| English pictures<br>Malay pictures | 60.00<br>100.00 | 5.05 | <0.001 |
| English words<br>Malay words | 83.33<br>100.00 | 4.68 | <0.001 |

## DISCUSSION

We have demonstrated an intra-class correlation of 0.738 between the two versions of the NIHSS, which demonstrates a good agreement. In addition, the items related to language assessment also showed that respondents performed better and preferred the BM-NIHSS. We conclude that the BM-NIHSS is a valid translation of the original English version.

In this study, the overall agreement between the two NIHSS versions is between 0.611 and 0.823, indicating moderate to good concordance. Similarly, the percentage of observed agreement, item-per-item was also good, despite the overall poor to moderate kappa value. We propose that the lower kappa values are due to the kappa paradox. The paradox arises because of the effect of symmetrically unbalanced marginal totals when observed proportions are converted to kappa. On some of the scale items, although we found that the kappa coefficient was low, the rate of observed agreement was high (refer Table 2, items 1A, 1C, 2 and 5A). This discrepancy may have occurred due to a lack of abnormal clinical findings for these items suggesting that the raters may have scored the items randomly. When there is consistency of raters to make positive or negative decisions, regardless of the accuracy of their findings, agreement due to chance is high. In this situation, the high-observed agreement, when corrected for high-expected agreement, results in a low kappa value. Kappa coefficients or any derived measure of agreement, must be interpreted with reference to the crude rate of intra-rater agreement.[16-18]

The NIHSS has been validated and cross-culturally adapted in many different countries. The Italian NIHSS was validated in of one of the biggest NIHSS adaptation studies, with 1556 raters participating (850 nurses, 460 physicians, 246 neurologists). The testing incorporated in excess of 5 training videos and inter-rater agreements were used as the outcome measure.[9] In countries where bilingual ability (native language and English) is a limitation, the validation process was done differently. For the Korean, Thai and Spanish NIHSS validations (K-NIHSS, NIHSS-T, SV-NIHSS) for instance, the NIHSS was translated into the respective languages and tested by a set of raters on a number of patients. The NIHSS score at baseline was then used to correlate with modified Rankin Scale (mRS) and Barthel Index (BI) scores at 90 days using Spearman rank correlation coefficients.[11-13] A good correlation was considered an indicator that the translation was accurate and valid. In comparison, the methodology used in validation of the Hindi NIHSS was most similar to ours where a single rater administered both versions of the NIHSS.[10]

All four versions of the NIHSS, mentioned above, included cultural and linguistic adaptation of the language assessment items to varying degrees. There were no major adjustments to the Boston Cookie theft in the Thai and Spanish versions, but for the Korean and Hindi versions, the whole picture was substituted. For items related to repetition, reading and naming, some were retained while others replaced to suit local language and culture.[10-13] We adopted the same approach and ensured that where possible, the assessment of dysarthria matched the original in terms of the number of syllables and the presence of vowels and consonants.

We noted that doctors performed better than paramedics and nurses in administering the NIHSS, regardless of the language version used. This is likely due to a lack of experience amongst non-doctors in performing the NIHSS as some of our raters had never used or even heard of the NIHSS before participating in our study. The primary objective of our study was to measure agreement between the two language versions of the NIHSS and not to measure how accurate the raters were at using the NIHSS. Our results, however, clearly indicate that supporting medical staff require training on the proper administration and use of the NIHSS. We hope that having a BM-NIHSS will enable us to train more of our staff and provide them with a tool that they are more comfortable with and easier to understand.

The respondents in our study showed significantly higher scores on the BM-NIHSS compared to the English version, irrespective of which version was completed first. For repetition, reading and naming, patients scored better in BM. However, when it came to describing the scene, there was no significant difference in scores. This may be explained by the fact that the original scene is relatively easy to describe and culture-neutral. The approach we adopted of substituting the illustrations with ones that were clearer and more culturally appropriate is a modification suggested even by the designers of the NIHSS.[15] We anticipated that the majority would be more comfortable with the BM-NIHSS. When patients were requested for their feedback, all felt that the translated version was culturally more appropriate and 94% reported that they found the words and phrases in BM easier to pronounce. The lower educational level of respondents reflects the hospital's catchment

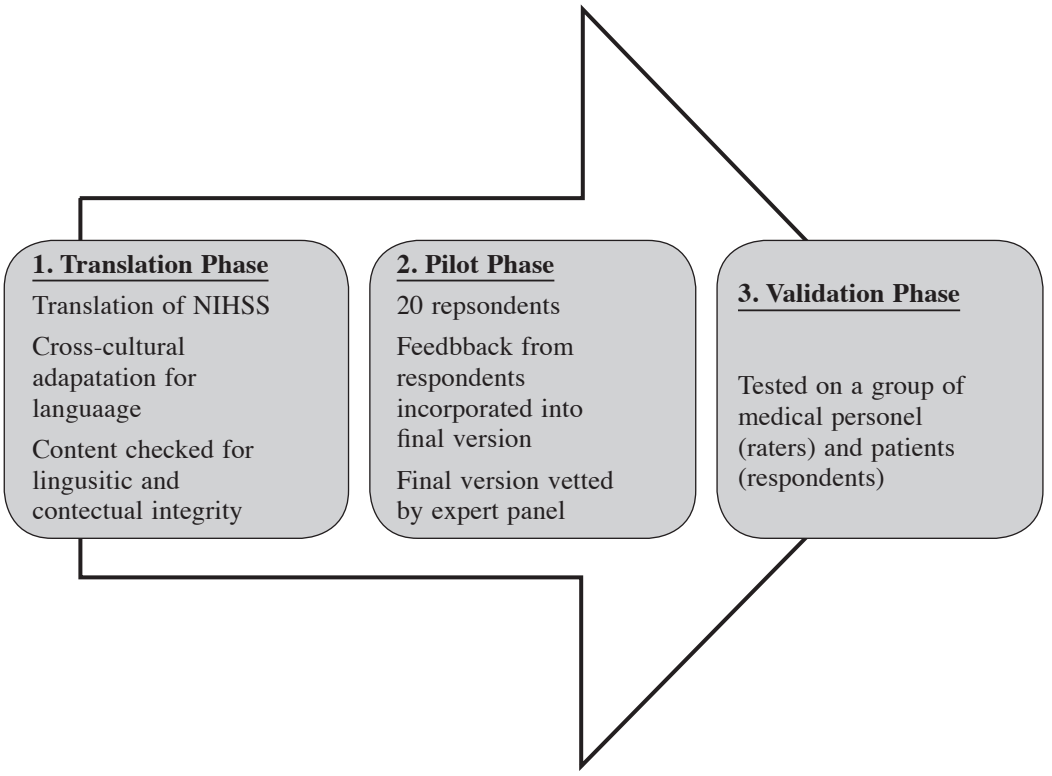



Figure 3. Diagram showing step by step methodology process

area and arguably is an accurate representation of the country. While many Malaysians consider themselves bi-lingual, the ability to complete tests like NIHSS in English is probably limited. The local population is better served having a test in the national language regardless of ethnicity.

To our knowledge, there are no studies that have validated a translated version of the NIHSS as we have. We conducted a test-retest reliability study comparing the English and BM versions on raters using assessment videos in the corresponding languages. We then tested the language assessment items separately on a group of stroke patients and evaluated their scores, as well as asking them to provide feedback.

Our results might have shown a better inter-rater correlation if more raters had participated or if we had used the same number of raters and tested them using more than one set of English-BM matched training videos. We were also unable to quantify the degree of bilingualism amongst our raters and respondents and how well matched their language skills were.

In conclusion, we anticipate that having a validated BM-NIHSS will promote its usability by BM-speaking healthcare professionals, especially paramedics and nurses. This, we hope, will lead to more efficient assessment of stroke severity, even at point of first contact, and lead to a reduction in door to scan times and consequently, door to needle times as well. An audit of these parameters is planned for in the future.

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## DISCLOSURE

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Conflicting of interest: None

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**Masa Ujian di jalankan**: __ __:__ __ ( )am ( )pm

**Nama Pegawai Pemeriksa**: _____

Skala strok perlu dilakukan dengan mengikut aturan. Pencapaian bagi setiap kategori perlu direkodkan. Ujian yang telah dilakukan tidak boleh diulangi serta markah tidak boleh diubah. Sila ikut arahan yang disediakan bagi setiap teknik pemeriksaan. Markah yang diberikan adalah berdasarkan kepada kemampuan pesakit melakukan arahan yang diberi; bukannya apa yang pegawai pemeriksa fikir pesakit boleh lakukan. Markah perlu direkodkan sewaktu ujian dilakukan dan ianya perlu dilakukan dengan pantas. Pesakit tidak boleh ditunjukajar [ie arahan diulang untuk membolehkan pesakit melakukannya] kecuali bila perlu.

| Arahan | Maksud skala | Markah |
|---|---|---|
| **1a. Tahap kesedaran**<br><br>Jika penilaian yang lengkap terbatas disebabkan oleh pesakit mempunyai tiub endotrakeal, kecederaan atau balutan pada endotrakeal atau batasan memahami bahasa, pemeriksa perlu memilih tindakbalas yang sesuai.<br><br>Markah 3 hanya akan diberikan jika pesakit tidak memberikan sebarang tindakbalas [selain daripada pergerakan refleks] terhadap rangsangan yang menyakitkan. | 0 = **Sedar** serta bertindakbalas.<br><br>1 = **Tidak sedar tetapi bangun dengan ransangan yang kecil** sama ada dengan mengikuti arahan, menjawab atau bertindakbalas.<br><br>2 = **Tidak sedar; memerlukan rangsangan berulang**, buntu dan memerlukan rangsangan yang kuat atau menyakitkan<br>Untuk membuat pergerakan (tidak stereotaip).<br><br>3 = Tindak balas hanya dengan refleks motor atau tindakbalas autonomik **atau tiada tindakbalas langsung**, flasid dan tidak mempunyai tindakbalas refleks. | |

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| | | |
|---|---|---|
| **1b. Soalan Tahap Kesedaran**<br><br>Pesakit disoal tentang bulan dan umur / beliau. Jawapannya mestilah tepat – tiada markah separa untuk jawapan yang hampir tepat.<br><br>Pesakit yang tidak boleh bercakap dan kebingungan serta tidak memahami soalan akan diberikan markah 2.<br><br>Pesakit yang tidak dapat bercakap kerana intubasi, trauma orotracheal, dysarthria teruk dari apa-apa sebab, halangan bahasa, atau masalah lain yang bukan disebabkan oleh tidak boleh bercakap akan diberikan markah 1.<br><br>Adalah penting bahawa hanya jawapan awal digredkan dan pemeriksa tidak "membantu" pesakit secara lisan atau bukan lisan. | 0 = **Menjawab kedua-dua** soalan dengan betul.<br><br>1 = **Menjawab satu** soalan dengan betul.<br><br>2 = **Tiada jawapan** yang betul. | |
| **1c. Arahan Tahap Kesedaran**<br><br>Pesakit akan diminta untuk membuka dan menutup mata dan kemudiannya, dengan menggunakan tangan di belah yang tidak lemah, menggenggam dan membuka tapak tangannya semula.<br><br>Gantikan dengan arahan satu langkah yang lain jika kedua- dua tangan tidak boleh digunakan.<br><br>Markah diberikan sekiranya kedua-dua percubaan dibuat tetapi tidak selesai disebabkan oleh kelemahan.<br><br>Jika pesakit tidak bertindakbalas mengikut arahan, tugasan hendaklah diterjemahkan dalam bentuk perbuatan kepadanya (pantomim), dan hasilnya diberikan markah (cth: tidak mengikut arahan langsung, melakukan satu arahan sahaja atau melakukan kedua-dua arahan).<br><br>Pesakit yang mengalami trauma, anggota badan yang dipotong, atau halangan fizikal lain perlu diberi arahan satu langkah yang bersesuaian. Hanya percubaan pertama sahaja akan diberikan markah. | 0 = **Menjalankan kedua-dua** arahan dengan betul.<br><br>1 = **Menjalankan satu** arahan dengan betul.<br><br>2 = **Tidak menjalankan** kedua-dua arahan dengan betul. | |

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| **2. Penglihatan terbaik**<br><br>Hanya pergerakan mata melintang akan diuji. Pergerakan mata secara sukarela atau refleksif (oculocephalic) akan diberikan markah, tetapi ujian kalorik tidak akan dilakukan.<br><br>Jika pesakit mempunyai pandangan konjugat bertentangan yang boleh diatasi dengan pergerakan mata secara sukarela atau refleksif, markah 1 akan diberi.<br><br>Jika pesakit mempunyai kelemahan saraf periferi khusus kepada saraf III, IV, VI (CN III, IV atau VI) berikan markah 1. Ujian penglihatan boleh diuji keatas pesakit yang tidak boleh bercakap.<br><br>Pesakit dengan kecederaan mata, mata ditutup dengan pembalut, buta, atau gangguan medan penglihatan atau ketepatan penglihatan, perlu diuji dengan pergerakan refleksif, berdasarkan pilihan yang dibuat oleh penyelidik.<br><br>Memastikan mata bertentang dengan pesakit dan kemudian bergerak ke kiri dan ke kanan boleh membantu dalam mengenalpasti wujudnya kecacatan pandangan yang separa (partial gaze palsy). | 0 = **Tiada kecacatan.**<br><br>1 = **Kecacatan penglihatan separa**; pandangannya adalah tidak normal dalam satu atau kedua-dua mata, Tetapi tiada sisihanpaksa (forced deviation) atau kecacatan pandangan secara menyeluruh.<br><br>2 = **Sisihanpaksaan**, atau kecacatan pandangan secara menyuluruh yang tidak boleh diatasi dengan gerakan mata-otak (oculocephalic manouvre). | |
| **3. Medan Penglihatan:**<br><br>Medan penglihatan (kuadran atas dan bawah) diuji secara berdepan dengan pesakit, sama ada menggunakan pengiraan jari atau stimulasi visual, sebagaimana yang sesuai.<br><br>Pesakit boleh diberi ransangan, tetapi jika mereka melihat pada sisi jari yang bergerak, ini boleh diberi markah sebagai normal. Jika sebelah mata buta atau tiada bola mata disebabkan oleh enukleasi, mata yang tidak terjejas sahaja diuji.<br><br>Markah 1 diberikan jika medan penglihatan pada sebelah pihak sahaja yang terjejas, walaupun hanya suku medan (quadrantanopia) Jika pesakit adalah buta atas apa-apa sebab, markah 3 diberikan.<br><br>Rangsangan serentak di kedua-dua belah juga dilakukan. Jika terdapat perbezaan atau pengabaian, pesakit menerima markah 1. Kriteria ini akan digunakan untuk jawapan kepada item **11.** | 0 = **Menjalankan kedua-dua** arahan dengan betul.<br><br>1 = **Menjalankan satu** arahan dengan betul.<br><br>2 = **Tidak menjalankan** kedua-dua arahan dengan betul. | |

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| **4. Kelemahan pada saraf muka:**<br><br>Arahkan secara lisan atau demonstrasi kepada pesakit untuk menunjukkan gigi, menaikkan kening dan menutup mata.<br><br>Untuk pesakit yang separa sedar atau kurang memahami arahan, markah diberi berdasarkan tindak balas mimik muka pesakit terhadap ransangan kesakitan, sama ada simetri atau lemah di belah kanan atau kiri.<br><br>Jika terdapat trauma di muka pesakit, atau tiub orotrakeal, pita pelekat, pembalut atau halangan fizikal lain yang menyelindungkan muka, ianya harus dialihkan seboleh yang mungkin. | 0 = Pergerakan adalah **normal dan sama** di kedua-dua belah kiri dan kanan.<br><br>1 = **Lumpuh kecil** (hilang lipatan nasolabial, tidak simetri pada muka ketika senyum).<br><br>2 = **Lumpuh separa** (kesuluruhan atau hampir kesuluruhan lumpuh di **bahagian bawah** muka).<br><br>3 = **Lumpuh sepenuhnya** di kedua-dua belah **atas dan bawah pada satu sisi** muka. | |
| **5. Motor Lengan**<br><br>Lengan diletakkan di dalam kedudukan yang betul: lengan diangkat lurus ke atas (tapak tangan menghadap ke bawah) pada paras 90 darjah (jika duduk) atau 45 darjah (jika dalam posisi baring).<br><br>Markah akan diberikan jika tangan beransur turun atau jatuh dalam tempoh 10 saat.<br><br>Bagi pesakit yang tidak boleh bercakap atau memahami arahan, pesakit diberi ransangan melalui nada suara yang ditekankan atau demonstrasi. Tidak dibenarkan memberi ransangan kesakitan. Setiap anggota badan diuji satu persatu, bermula dengan lengan yang tidak lumpuh. Dalam kes dimana pesakit telah menjalankan amputasi pada sendi bahu atau penyatuan sendi bahu dan lengan (fused joint), pemeriksa perlu merekodkan skor sebagai tidak boleh diuji (TBU). Penjelasan kenapa kriteria ini tidak boleh diuji hendaklah direkodkan. | 0 = **Tidak jatuh**; lengan kekal terapung pada paras 90 atau 45 darjah untuk selama 10 saat.<br><br>1 = **Beransur turun**; lengan dapat diangkat ke paras 90 atau 45 darjah, tetapi beransur turun dalam tempoh 10 saat. Lengan yang menurun tidak terkena pada katil atau alat sokongan.<br><br>2 = **Sedikit tentangan terhadap graviti**. Lengan boleh diangkat melawan graviti, tetapi tidak sampai ke paras 90 atau 45 darjah, atau, sekiranya boleh sampai ke paras ini tidak dapat bertahan selama 10 saat.<br><br>3 = **Tidak boleh menentang graviti**; anggota badan jatuh apabila cuba diangkat.<br><br>4 = **Tiada pergerakan**.<br>TBU: Tidak Boleh Diuji ;<br>Nyatakan sebab: _____<br><br>**5a. Lengan kiri**<br><br>**5b. Lengan kanan** | |

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| **6. Motor Kaki**<br><br>Kaki diletakkan di dalam posisi yang betul: Kaki diangkat pada paras 30 darjah (ujian sentiasa dijalankan dalam keadaan baring terlentang).<br><br>Markah akan diberikan jika kaki menurun atau jatuh kurang dari 5 saat sewaktu diangkat. Untuk pesakit yang tidak boleh bercakap, pemeriksa disyorkan menggunakan suara yang tegas atau lakonan, tetapi tidak menggunakan ransangan sakit. Kedua-dua belah kaki diuji, bermula dengan kaki yang boleh bergerak. Untuk pesakit yang sudah dipotong kaki atau sendi pinggul yang sudah dicantumkan; markah perlu direkodkan sebagai Tidak Boleh Diuji [TBU]. Penjelasan kenapa kriteria ini tidak boleh diuji hendaklah direkodkan. | 0 = **Tidak jatuh**; kaki kekal pada kedudukan 30 darjah untuk 5 saat.<br><br>1 = **Beransur turun**; kaki jatuh dalam masa 5 saat tetapi tidak terkena katil.<br><br>2 = **Sedikit tentangan terhadap graviti**; mempunyai beberapa usaha untuk menentang graviti tetapi **kaki jatuh dan terkena katil** sebelum 5 saat.<br><br>3 = **Tidak boleh menentang graviti**; kaki jatuh dengan segera apabila diangkat.<br><br>4 = **Tiada pergerakan**.<br><br>TBU:<br>Nyatakan sebab: _____<br><br>**6a. Kiri Kaki**<br><br>**6b. Kaki Kanan** | |
| **7. Kehilangan keseimbangan anggota**<br><br>Bahagian ini bertujuan untuk membuktikan kecederaan sama ada di sebelah kanan atau kiri cerebellum. Ujian dilakukan dengan keadaan mata pesakit terbuka.<br><br>Dalam kes kecacatan penglihatan, ujian dijalankan pada mata yang tidak terjejas. Ujian jari-hidungjari dan ujian tumit-tulang kering dijalankan pada kedua-dua belah kaki, dan markah hanya diberikan jika kehilangan keseimbangan tidak sepadan dengan kelemahan anggota. Kehilangan keseimbangan tidak boleh diuji terhadap pesakit yang tidak faham atau lumpuh.<br><br>Dalam kes amputasi anggota atau sendi yang dicantumkan, pemeriksa perlu merekodkan skor sebagai Tidak Boleh Diuji (TBU), dan dengan jelas menulis penerangan dalam pilihan ini. Untuk pesakit yang buta, ujian dijalankan dengan pesakit menyentuh hidung dari posisi lengan yang diluruskan. | 0 = **Tiada**.<br><br>1 = **Satu anggota** sahaja terlibat. (tangan atau kaki).<br><br>2 = **Dua anggota** terlibat. (tangan dan kaki).<br><br>TBU = Pemotongan atau cantuman sendi.<br>Nyatakan sebab:_____ | |

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| **8. Deria rasa**<br><br>Dapat merasai atau berkerut muka pada ransangan yang menyakitkan. Bagi pesakit yang separa koma atau tidak dapat bercakap, pesakit akan mengalihkan anggota yang dirangsang.<br><br>Deria rasa yang hilang disebabkan oleh strok sahaja yang akan diberi markah tidak normal. Pemeriksa perlu menguji sebanyak mungkin kawasan badan (lengan [bukan tangan], kaki, badan, muka) bagi memastikan kehilangan deria rasa pada separuh badan pesakit adalah tepat.<br><br>Markah 2 diberikan untuk "kehilangan deria yang teruk atau sepenuhnya", hanya boleh diberikan apabila kehilangan deria rasa yang teruk atau sepenuhnya dapat dibuktikan.<br><br>Maka, markah 0 atau 1 akan diberikan kepada pesakit yang separa koma atau tidak boleh berkata-kata.<br><br>Markah 2 diberikan secara automatik kepada<br>- pesakit yang mengalami strok pada pangkal otak yang kehilangan kedua-dua belah deria rasa.<br>- pesakit yang tidak bertindak balas dan lumpuh seluruh badan.<br>- Pesakit dalam keadaan koma (item 1a = 3) | 0 = **Normal**; tiada kehilangan deria rasa.<br><br>1 = kehilangan deria rasa yang **ringan-sederhana**. Pesakit akan merasakan cucukan pin itu kurang tajam atau tumpul pada kawasan badan yang diuji; atau hilang deria sakit pada permukaan kulit yang dicucuk tetapi pesakit sedar dianya disentuh di kawasan terlibat.<br><br>2 = **Teruk - hilang deria rasa sepenuhnya**; pesakit tidak sedar yang dia disentuh pada muka, tangan dan kaki. | |

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| **9. Keupayaan Bahasa**<br><br>Kebanyakan maklumat berkaitan dengan kefahaman bahasa dapat diketahui semasa menilai pesakit melalui item-item yang telah dilakukan pada peringkat awal ujian ini.<br><br>Untuk item ini, pesakit diminta untuk menggambarkan atau menceritakan apa yang berlaku dalam gambar, menamakan atau melabelkan objek-objek di dalam gambar serta membaca dari senarai ayat yang dilampirkan.<br><br>Kefahaman bahasa dinilai berdasarkan jawapan atau respon pesakit dalam item ini, dan juga kepada semua arahan dalam ujian-ujian yang terdahulu.<br><br>Jika masalah penglihatan mengganggu ujian yang dijalankan, benarkan pesakit memegang objek sebenar untuk dinamakan, ulang perkataan atau ayat yang didengari, dan minta pesakit bercakap.<br><br>Pesakit yang diintubasi diminta untuk menulis.<br>Pesakit dalam keadaan koma (item 1a = 3), akan diberikan markah 3 secara automatik untuk item ini.<br><br>Pemeriksa perlu menentukan markah yang sesuai untuk pesakit yang bingung atau kurang memberikan kerjasama. Markah 3 hanya boleh diberikan jika pesakit itu bisu, dan tidak boleh mematuhi sebarang arahan yang mudah [arahan satu langkah]. | 0 = Boleh bertutur; normal.<br><br>1 = Tidak boleh bertutur (**afasia**) tahap **ringan hingga sederhana**; kurang kelancaran berbahasa, kurang keupayaan memahami tetapi mampu meluahkan idea atau menyampaikan hasrat, kurang menghasilkan pertuturan dan/ atau kurang memahami bahasa menyebabkan perbualan berkaitan bahan yang disediakan menjadi sukar ataupun mungkin mustahil. Sebagai contoh, pemeriksa masih boleh mengenalpasti/ memahami intipati maklumat yang ingin disampaikan oleh pesakit walaupun tidak tepat/jelas apabila gambar ujian ditunjukkan kepada pesakit.<br><br>2 = **Afasia tahap teruk**; komunikasi hanya tercapai melalui penghasilan bahasa yang terhad; pesakit memerlukan bantuan dan soalan lanjut daripada pendengar dan pendengar meneka apa yang ingin disampaikan oleh pesakit. Kepelbagaian maklumat yang dikongsi oleh pesakit sangat terhad; kejayaan dalam komunikasi lebih bergantung kepada pendengar, bukan pesakit. Pemeriksa tidak dapat mengenalpasti bahan ujian berpandukan pada jawapan pesakit.<br><br>3 = **Afasia menyuluruh /bisu**, pesakit tidak menghasilkan apaapa perkataan atau ayat yang bermakna dan tidak berupaya memahami maklumat yang diterima melalui pendengaran (dan ia bukan disebabkan oleh masalah pendengaran) | |

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| **10. Disarthria atau Pelat Pertuturan**<br><br>Jika pesakit dianggap sebagai normal, pertuturan yang memadai boleh diperolehi dengan meminta pesakit membaca atau mengulang perkataan dalam senarai yang dilampirkan. Jika pesakit mengalami afasia yang teruk, kejelasan sebutan atau pertuturan spontan (yang diperoleh berdasarkan perbualan untuk item-item yang lebih awal) masih boleh dinilai. Jika pesakit diintubasi atau mengalami halangan fizikal yang tidak membolehkan pesakit menghasilkan pertuturan, pemeriksa harus merekodkan bahawa item ini tidak diuji dan menulis penerangan tentang hal ini. Jangan beritahu pesakit mengapa beliau diuji atau tidak diuji. | 0 = **Tiada dysarthria**; Normal.<br><br>1 = **Disarthria tahap ringan - sederhana**; pesakit pelat atau kurang jelas dalam sebutan perkataan. Dan dalam keadaan yang paling teruk pun masih boleh difahami oleh pendengar walaupun sukar.<br><br>2 = **Disarthria tahap teruk**; pertuturan pesakit sangat tidak jelas sehingga tidak dapat difahami oleh pendengar dan ia tidak disebabkan oleh afasia atau keadaan bisu.<br><br>TBU = pesakit diintubasi atau terdapat halangan fizikal yang lain. Intubasi atau halangan fizikal yang lain.<br><br>Nyatakan sebab:_____ | |
| **11. Pengabaian dan Kurang perhatian**<br><br>Maklumat tentang pengabaian boleh dikumpulkan berdasarkan ujian-ujian yang dijalankan di awal penilaian. Jika pesakit hilang penglihatan yang teruk sehingga menghalang rangsangan penglihatan serentak di kedua belah medan penglihatan, tetapi rangsangan kulit adalah normal, markah yang diberikan adalah normal. Jika pesakit tidakboleh bercakap (afasia) tetapi bertindakbalas kepada kedua-dua belah kiri dan kanan, ianya diberikan markah normal. Pengabaian medan penglihatan atau anosagnosia juga boleh diambil sebagai bukti tidak normal. Memandangkan markah diberikan jika tindakbalas adalah tidak normal, maka bahagian ini hendaklah sentiasa diuji | 0 = **Normal**.<br><br>1 = **Pengabaian kepada stimulasi diri sendiri, visual, sentuhan, pendengaran, ruang**. Mengabaikan atau tidak memberi tumpuan sepenuhnya terhadap rangsangan serentak di kedua-dua belah kiri dan kanan keatas mana-mana ransangan di atas.<br><br>2 = **Hilangan tumpuan, pengabaian atau tidak boleh mengenalpasti lebih dari satu komponen**; Tidak dapat mengenalpasti tangan sendiri atau hilang orientasi kanan dan kiri. | |

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**Awak kan tau.**

**Rasa rendah diri.**

**Saya balik rumah.**

**Atas meja dalam bilik.**

**Mereka nampak dia dalam tv.**

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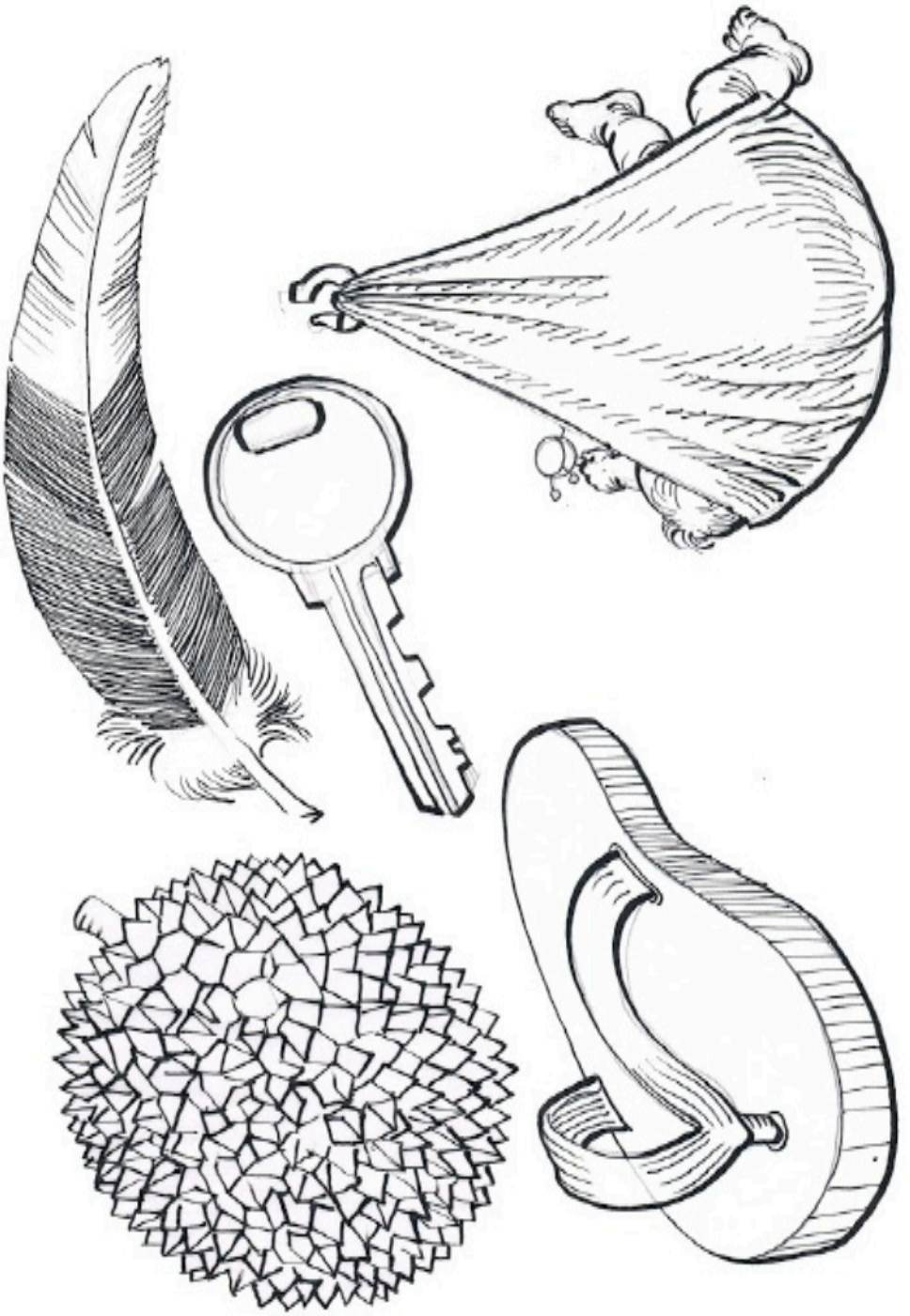

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**MAMA**

**LIP-LAP**

**TINGGI- TINGGI**

**CUACA**

**PERTUNJUKAN**

**STESEN KERETAPI**

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