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A Qualitative Assessment of Health Professionals' Practices and Perceptions towards Age Estimation in Uganda

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Abstract

Introduction: Various guidelines for age estimation based on scientific evidence have been developed by expert groups and bodies internationally. In Uganda, the guidelines and methods being used to estimate the age of juveniles undergoing judicial proceedings are not known. **Aim:** This study explored the practices and perceptions of the health professionals working with the police towards age estimation for juveniles undergoing criminal proceedings in Uganda. **Methods:** It was a qualitative study using key informant interviews. Seventeen health professionals working in private clinics and general government hospitals linked to the police were purposively selected. Data were collected using a key informant interview, which allowed the participants to express their views and perceptions concerning the different aspects of the age estimation process. The information gathered focused on the methods used to estimate age and their appropriateness, particularly based on the third molar eruption. The data were analysed using thematic content analysis methodology. **Results:** It was found that the current practice of age estimation in the country does not fully adapt to international standards and that there are variations among the users. **Conclusion:** The standardisation of age estimation methods is urgently needed in the country through the use of a multidisciplinary approach and an emphasis on combining methods in order to increase accuracy.

Keywords: Age Estimation, Defilement, Forensic Science, Juveniles, Third Molar

Introduction

Globally, the demand for Forensic Age Estimation (FAE) among live persons is increasing due to the high numbers of migrants and asylum seekers, especially into the United States of America and Europe[1] without documentary evidence to prove their age. In this regard, accurate age estimation is a requirement because of the growing crime rates among children and adolescents. In addition to the migration requirements, forensic age estimation is also key in many other situations, including judicial processes, employment, and sports, among others[2]. Forensic Age Estimation (FAE) is an important process for juvenile justice because it entails the estimation of the unknown chronological age of persons involved in judicial or legal proceedings[3]. According to Ugandan law, People under the age of 18 years are considered minors and the minimum age of criminal responsibility is 12 years. Thus, children between 12-17 years old cannot be committed to a prison; instead, they are detained in a remand home and after conviction, they are sent to the Kampiringisa National Rehabilitation Center[4]. This facility is for children aged between 12-17 years old who have gone through court and have been convicted.

Various guidelines and recommendations for age estimation based on scientific evidence have been developed by expert groups and bodies internationally. These guidelines are aimed at standardizing the generation of skilled reports and implementing quality assurance measures in the field of age estimation. Examples of

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prominent expert groups or bodies in this field include the American Board of Forensic Odontologists (ABFO)[5], the International Organization for Forensic Odonto-Stomatology (IOFOS)[6], the Study Group on Age Estimation of the German Society of Legal Medicine (AGFAD)[7] and the Forensic Anthropology Society of Europe (FASE)[8]. Numerous countries, including Germany[9] and Italy[10] among others have adopted the guidelines developed by these groups and use them as tools for age estimation predominantly among asylum seekers and migrants.

Despite these guidelines being adopted elsewhere, in Uganda, the guidelines and methods being used to estimate the age of juveniles undergoing judicial proceedings are not certain. Yet according to the Uganda Police Annual Report of 2017[11], the number of child offenders and victims is on increase. In addition, most children who have attained the age of criminal responsibility do not have birth certificates, so determining their age is of paramount concern. As a result, the purpose of this study was to investigate the practices and perceptions of health professionals working with police to estimate the age of juveniles undergoing criminal proceedings in Uganda.

Materials and Methods

Study Setting and Design

This was a qualitative study conducted during the period January to April 2018 in five districts of Kampala, Gulu, Kabarole, Mbale and Mukono in Uganda. These districts are located in the northern, western, eastern and central parts of the country. They were purposively selected for the study because they have remand homes in the country. Currently, the country has five remand homes and one national rehabilitation centre at Kampiringisa. The children remanded in the homes are mainly from these districts and surrounding areas, although the national rehabilitation centre houses children from the entire country.

Selection of the Study Population

The study population comprised health professionals working within the police health facilities, locally referred to as police surgeons, in addition to those working with private clinics and at government health facilities who were directly involved in the age estimation process within the five districts. In order to select and identify the key informants for the study, police stations in the selected districts were visited and permission to carry out the study was sought. The police officer in-charge at a given station was requested to provide a list of names and the contacts of health professionals to whom they refer individuals who require age estimation. A total of 20 names were provided and we intentionally sought individuals with experience and those with postgraduate training in forensic sciences because we deemed them to be rich with the information required for the study. Kampala was singled out as a special case because it is administratively divided into five divisions: Makindye, Central, Kawempe, Nakawa and Rubaga, thus having the majority of health professionals working with the police. A sample of 17 names was selected from the list and 3 names all from Kampala, were dropped because two were newly recruited with less than 3 months in service and one had taken sick leave. Thus, the distribution of participants according to the districts was as follows: nine in Kampala, three in Gulu, two in Kabarole, one in Mbale and two in Mukono.

Study Instrument

We used an unstructured interview guide that was developed after seeking expert opinion. The guide allowed the participants to express their views on the different aspects of the age estimation process. It included ten open-ended questions divided into demographics and two broad themes, which included methods used to estimate the age of juveniles in judicial proceedings and health professionals' attitude towards these methods.

Methods Used to Estimate Age

Concerning the methods used to estimate age, we inquired each question whether the key informants had heard about forensic age estimation, had been involved in the practice of age estimation among juveniles, to explain the process one goes through to estimate the age of an individual, whether they had received specific training to undertake the process, the cadre mandated to do age estimation and why them, circumstances under which they do age estimation. Key informants were also asked to comment on the appropriateness of the age estimation approaches. They were further asked whether they have used the third molar tooth for age estimation; circumstances under which the third molar tooth is used, how and why it is used for age estimation, the challenges

faced while using the third molar tooth and how using this tooth could be improved.

Perceptions of the Key Informants (Health Workers) Towards the Age Estimation Methods

For the questions relating to perceptions, we asked the informants what their views were towards the age estimation practice currently in use, its need and what their opinion was concerning the appropriateness of the process.

Interviews

The key informants were contacted by phone in order to schedule an appointment for the consenting process. The interviews were conducted after the consenting process at the key informant's office at the health facility where they worked. The interviews were conducted by the principal investigator (a dental surgeon) as the lead researcher and were assisted by an assistant whose chief responsibility was to capture the dialogues by means of a written script and a voice recorder. These interviews were performed in English since all the key informants were technical individuals well versed in the language. The interviewers had undergone training in qualitative data collection earlier and hence had technical competence in conducting and carrying out these interviews. Prior to the research, the interviewers carried out practice interviews with two health professionals at a Private Health Facility in Mukono district. This was done under the direct observation of a qualitative expert in order to maintain internal consistency in the data collection process. The data from these interviews was not included in the main survey; however, modifications were made to the questionnaire to improve clarity after the pre-test. All the interviews were recorded with permission from the participants. Interviews lasted for about 30-45 minutes and all key informants were compensated for their time.

In order to institute trustworthiness for this study, the concepts of credibility, transferability, dependability and conformability were considered important elements of quality based on Guba's four criteria for trustworthiness[12]. Credibility and transferability were emphasised by detailing the methods in the protocol and in this publication in order to convey the actual situations that were investigated. The study context has also been reported to enable other researchers to decide whether the settings are similar to others and whether the findings can be applied to other settings. Dependability was achieved by describing the methodology clearly to enable a future investigator to repeat the study. Conformability has been achieved by reporting the findings from the data and these are supported by quotations from the participants' discussions.

Data Analysis

Subsequent to the interviews, the data were transcribed verbatim and their correctness was checked using the three data sources (interviewer notes, recorded information and the research assistant). Data were analysed using the thematic content analysis methodology, following the six steps. Familiarisation of the data was accomplished by reading through the text twice while taking notes. Various phrases and sentences within the text were then highlighted and coded, and each code described an idea or feeling expressed as related to the research question.

The coded data with similar features were then clustered under two pre-set themes derived from the study objectives, namely, practice and perceptions. The coded data under each theme was then grouped into different categories of subthemes. The extracted sub themes were matched with the data and finally construed. For purposes of verification of the results, another person (qualified in qualitative research) read through half the scripts (8 scripts) and came up with sub-themes that were compared to the results; in instances of disagreement, discussions between the interviewer and the second person were held until a mutual interpretation was reached.

In order to ease identification and preserve the participants' original ideas, the quotations were labelled as follows; for instance, D1P1, where the first digit represents the district number: Kampala (D1), Gulu (D2), Fort Portal (D3), Mbale (D4) and Mukono (D5) and the second digit represents the participant number. Thus, D1P1 would signify participant 1 from Kampala district.

Ethical Considerations

The study proposal was approved by Makerere University, School of Health Sciences Research and Ethics Committee (protocol no. 2017-040). Permission to carry out the study was obtained from the Uganda Police Administration and the Uganda National Council of Science and Technology. Informed consent was obtained from the selected participants in accordance with the Helsinki Declaration. The investigators informed the participants of the

procedure, its objectives and benefits, and any possible risks involved. Confidentiality was ensured by avoiding the use of any personal identifiers.

Results

Description of the Study Participants

Seventeen key informants were interviewed. They were all males with an age range of 25-65 years. Majority 41.2% (8/17) had attained a diploma in clinical medicine, 23.5% (4/17) had a bachelors' degree in Medicine and Surgery while 35.3% (6/17) had a masters' degree in Medical in Pathology and post graduate diploma in forensic sciences. In addition, more than half 64.7% (11/17) were in public practice, while 17.6% (3/17) were in private practice and 17.6% (3/17) were in retirement offering medical services with the government. The average length of time that they had worked with the police was 6 years, ranging between 6 months to 30 years.

Practice Used for Age Estimation

The theme for practice in this instance referred to the methods used to estimate age. The transcribed data from this theme produced four major subthemes that included: circumstances for age estimation; third molar tooth eruption for age estimation; counting of teeth as a method for age estimation; other methods used in combination with the dentition to estimate age. The issues that emerged from these sub-themes are presented below:

Circumstances for Age Estimation

The study established from the key informants that the legally mandated professionals to estimate age for purposes of judicial procedures are registered midwives, medical doctors and clinical officers. We noted that the common circumstances under which age estimation was required by law included: instances of criminal offences involving children and juveniles in order to differentiate between adults and children and in some cases, age for employment or school entry. Below are some excerpts of the views from the key informants regarding circumstances requiring age estimation.

> "We are asked to determine the age of victims of defilement to find out whether they are 18 years old or younger. We are also asked to estimate the age of offenders of serious crimes because it is assumed that one cannot commit a crime unless they are criminally liable." D3P2

Some key informants reported that age estimation is required following parents' or relatives' dissatisfaction with the estimated age for their children during the judicial process. They thus appeal for age estimation to be repeated in order to resolve this matter and an appropriate placement is made in either the remand home or prison depending on the age of the individual. While others reported that age estimation may be done for purposes of screening for inmates as requested by courts of law. The screening of inmates aids in correctly assigning individuals to remand homes or prisons based on their age. This was pointed out by one of the key informants, as revealed below:

> "The remand home from time to time requests that I screen inmates and estimate their age. This is because inmates who attain the age of eighteen are transferred from the remand home to prison." D1P6

Third Molar Eruption for Estimation of Age

During the interviews, the key informants were asked to point out the most preferred methods used in age estimation. The third molar was found to be one of the key tools used to determine the age of an individual under criminal proceedings. The majority of the participants asserted that the third molar defines maturity and that when it is seen in the mouth, it denotes that the individual is 18 years of age or older. Below are some of the excerpts from the key informants regarding this subtheme.

> "I opt for the third molar because, legally speaking, we look for that boundary to ascertain whether the person is above or below 18 years old. The third molar gives us that boundary." D2P3

The third molar was the preferred method for determining the age of victims and offenders in cases of defilement or rape. Some key informants mentioned that this tooth can be utilized for age determination under all circumstances. While others considered it to be an ideal method for age estimation as prescribed by law. Some went a step further and considered its appearance and stage of eruption

to be important as well. Although some prefer to use it in combination with other methods, some use it as a confirmatory test for age 18. Below is a narrative by one of the key informants regarding the third molar.

> "The third molar tooth may not be completely erupted, but as long as I observe any part of its crown in the mouth, that will mean that the individual is above the age of 17 years, and so accordingly, I will conclude that someone is 18 years of age or older." D1P4

Counting of Teeth as a Method for Age Estimation

We found that the other teeth, in addition to the third molar, are also routinely used by the majority of the health workers in the age estimation process, mainly by considering the number of teeth present in the oral cavity. Twenty teeth present would signify a child under 6 years old and 32 teeth would signify an adult of 18 years and above. There seemed to be inconsistencies and difficulties when estimating the ages of 15-17 years, as illustrated in the excerpts below.

> "When you examine a child and find that he or she has about 20 milk teeth, then most probably the child is not more than 6 years old. When you find more than 20 teeth, the child is older than 6 years because he or she has both milk and permanent teeth. When permanent teeth start to erupt, it becomes difficult to determine the age of the child using this formula. Anyone above 18 years, we expect them to have 32 teeth." D2P2

> "A person with 26 teeth is probably 15 years old or younger; someone with 28 teeth is between 15-17 years old; and someone with 30 teeth is between 17-18 years old." D1P6

Other Methods Used in Combination to the Dentition to Estimate Age

During the interviews, some of the key informants pointed out that they used other methods in addition to the dentition in the practice of age estimation. It emerged that the other methods commonly used include; interviewing the individual concerning their age and date of birth, physical examination for the stature and general appearance of an individual were also mentioned as means for age estimation as well as observation of secondary sexual characteristics or consulting colleagues. Many used additional information like birth certificates, baptism certificates or immunisation certificates in order to certify age. A few other methods were mentioned, such as the use of radiographs and bone growth. However, they did not seem to use them at all due to the high cost implications and unavailability of specialists for interpretation. This is well illustrated by the excerpts below:

> "We employ many methods, like secondary sex characteristics, menarche, pubic hair and breast development, and we look at all those to see that we give an estimate that is fairly close to the truth." D2P1

Perceptions of the key informants on the appropriateness of using teeth to estimate age.

The perceptions theme elicited a person's thoughts on the appropriateness of using teeth in the age estimation practice. Regarding this theme, two sub-themes emerged: confidence in using teeth to estimate age and reservations about using teeth to estimate age. The results of the two sub-themes are presented here as follows:

Confidence Towards Using Teeth to Estimate Age

Some felt that using teeth was a good scientific method, which is ideal for the Ugandan setting. They perceived it as an easy method, reliable, considerably cheap and thus appropriate for use in this setting, as pointed out in some of the responses below:

> "If someone has gone through training, the method of using teeth to estimate age is easy to understand and easy to carry out." D4P1

Reservations Towards Using Teeth to Estimate Age

On the other hand, many felt that the use of the dentition was problematic and rudimentary and thus needed to be combined with other methods, as shown in the excerpt below:

"There are irregularities in this method, whereby some people may present with delayed maturity or delayed tooth eruption; that's why we say it's rudimental." D4P1

Discussion

This study found the mandated groups by law that estimate the age of juveniles and children undergoing judicial proceedings in Uganda: medical doctors, clinical officers and registered midwives. It is argued that these cadres have background training in forensic sciences and are thus suited to carry out this practice. However, in other settings like Germany[9] and other European countries[13], a multidisciplinary approach in the age estimation practice is emphasised with various disciplines in forensic and physical anthropology, odontology and general medical specialities like radiology and paediatrics. The lack of a multidisciplinary approach in this setting may probably explain some of the challenges faced in the age estimation process. It was also surprising to note that all of the key informants were of the male gender. Although it is worth noting that our study was restricted to districts with remand homes in other higher centres where these cases are tried, we may find females who participate in this process. Furthermore, females' fear of the emotional stress[14] normally associated with appearing in court to give evidence may deter them from joining this practice. Affirmative action by the police is likely needed to attract females to this field.

It was also noted that age estimation is normally required in certain circumstances when differentiating between an adult and a child, especially in cases of defilement. This is because sometimes the victims may not know their true age, or they may connive with their parents or guardians and lie about their true age for financial gain, since age is a major determinant of the court's outcome. Age estimation is also done in instances when screening for inmates following parents' or relatives' complaints to decide who deserves to be taken to a remand home or to prison. Age estimation, on the other hand, is a common practise among asylum seekers and migrants in European countries, particularly among unaccompanied minors[15]. In such cases, the individuals have no accompanying documents that can be used to establish their age, and sometimes the declared age of the individual is questionable. Other situations in which age estimation is required include migrant minors involved in criminal activities, which are perceived to be the most serious problem caused by their presence in a country[16]. In such cases, the courts require forensic age estimation expert reports in order to sentence the victims appropriately.

It was further observed that the methods commonly used to estimate age among juveniles undergoing legal proceedings in this present setting include:

- Interviewing the individual concerning their age and date of birth,
- Use of the dentition especially third molar eruption, and counting of teeth present in the mouth,
- Physical examination for secondary sexual characteristics, and
- Review of documents such as birth, baptism and immunisation certificates to confirm age.

These methods were considered to be cheap, easy to use and reasonably reliable for age estimation in this setting, especially when considered in combination. Interviewing individuals concerning their date of birth or recollection of special school events like national exams or dates when any special milestones took place like the age at menarche for a girl has been used to provide important clues to a person's age. Furthermore, the status of the dentition, including the number of teeth present and secondary sexual characteristics are also important biological maturation markers because they all develop at specific times in an individual's life. Though it has been argued that these biological maturation markers should be based on population-specific data because of the variability in maturation observed between ethnic groups[17]. On the other hand, there are interesting arguments against the use of these concepts in the age estimation process. Milani and Benso have questioned[18] the reliability of determining age based on biological maturation in view of the concept of biological variability, whereby individuals from the same ethnic group may present with different maturation periods. In addition, the Council of Europe member states' policies, procedures and practices[19] have argued that physical and medical age assessment methods are not backed by pragmatic medical science and thus they cannot be assumed to result in a reliable age estimation method. Therefore, when we consider the aforementioned, it should be pointed out that all age estimation methods

currently in use have both advantages and disadvantages and because of this none can predict the exact age of an individual with precision. This is one of the reasons why this process is referred to as age estimation and not age determination and it also calls for the use of these methods in combination in order to improve their precision.

International guidelines and recommendations on age estimation have been developed by various groups and bodies, including: the Study Group on Forensic Age Diagnosis (AGFAD)[7], which was founded in Berlin (2000) published guidelines on age diagnosis for living individuals for criminal, civil and asylum proceedings among others; The International Organization for Forensic Odonto-Stomatology (IOFOS)[6] published recommended procedures for quality assurance in forensic dental age estimation; the American Board of Forensic Odontologists (ABFO)[5] published a supplemental age estimation guide for forensic odontologists, and the Forensic Anthropology Society of Europe (FASE)[8] is a section of the International Academy of Legal Medicine (IALM). This aims at bringing together anthropologists, forensic pathologists, odontologists, geneticists and other experts in the fields of forensic medicine and forensic science for the scientific and academic promotion and development of the discipline of forensic anthropology across Europe.

However, despite the availability of various guidelines for age estimation, there are still challenges in standardising the procedures internationally. For instance, as explained by Schmeling and co-workers[20] there is no agreement among the European countries on the appropriate methods for the age estimation of a minor when this is required. In addition, discrepancies have been reported among experts regarding the steps to be followed in the age estimation practice. These discrepancies are highlighted by Solheim and Vonen[21] where they reported that some experts only use statistical methods to report results while others express their expert opinion by taking into consideration both the statistical methods and the living conditions of the individual such as their health status among others. The latter is in agreement with published guidelines like the German Interdisciplinary Working Group for Age Diagnostics which recommends that the individual's most likely age is estimated on the basis of all partial diagnoses and a critical discussion of the individual case[7].

According to the findings of this present study we observed that generally, the practice of age estimation in this setting does not fully conform to the international guidelines above. For instance, the Study Group on Forensic Age Diagnosis (AGFAD)[7] recommends combining three methods:

- Physical examination with determination of anthropometric measures, an inspection of signs of sexual maturation as well as identification of any age-relevant developmental disorders,
- X-ray examination of the left hand,
- A dental examination with determination of the dental status and X-ray examination of the dentition, plus an additional examination of the clavicles[6].

The present study found that although physical and dental examinations are being utilised in this setting, however, the actual manner of application varies, with some methods not being used at all. A case in point is the lack of x-ray examinations of the left hand and the dentition which is due to the limited availability of x-ray facilities and specialities in the country. This we believe, may reduce the efficiency of the age estimation practice in this setting.

However, the AGFAD recommendations on the other hand take into consideration occasions where x-rays may not be medically and ethically acceptable[9] due to various reasons including health implications. It has thus been argued that for age estimation purposes, where X-ray examinations are not performed for medical reasons, they may not be appropriate[9]. Hence, the AGFAD recommends the use of a physical examination that takes into account anthropometric data, signs of sexual maturity, potential age-related developmental disorders, and a dental examination that includes the recording of dentition status. Therefore, these additional recommendations may probably authenticate the methods used in this present setting.

This study also noted that the methods used for age estimation were not standardised among the key informants. This was especially evident in the use of the third molar eruption to estimate age. Whereas the majority considered it a method of choice for determining age and considered its presence to denote maturity, only a few went a step further and considered the stage of eruption to be key in ascertaining age. Surprisingly, some have considered its appearance in terms of colour,

with brownish colour and calculus deposits presenting as signs of maturity. This therefore shows the level of variability in the third molar usage that can be a source of error in the age estimation process. In addition, given that among Africans the third molar can erupt as early as 13 years of age[22], it cannot define maturity in such cases. In addition the different stages of third molar eruption occur at different ages[23] and so it would be prudent to know the age associated with the stage of eruption for accuracy. Furthermore, tooth eruption as a method for age estimation is not reliable because it represents only one stage in the continuous process of tooth eruption, in addition to the numerous factors that affect tooth emergence as a whole[24]. Thus, considering the above, using third molar eruption as a method for age estimation in this setting should be discouraged and probably replaced with the more robust third molar development methods. This is because third molar development has been recommended for age estimation during early and late adolescence in the various guidelines[5].

Tooth counting was found to be routinely used by most of the key informants to estimate the age of juveniles and young adults under judicial proceedings. We found this method quite questionable in this age group considering the fact that by age 14 all teeth would have erupted into the oral cavity apart from the third molars. This is confirmed by Hagg and Taranger[25] who observed that tooth counting can only be useful at ages where tooth emergence is anticipated. In their study, they found that by age 12, the urban Swedish children had attained 28 permanent teeth, apart from the third molars. This therefore implies that tooth counting as a method for age estimation has a limited application in age estimation, whereby in late adolescence and adulthood it may not be appropriate. Additionally, this method is not contained in the recognised procedures for age estimation for juveniles and young adults in the international guidelines[5]. Even then, there were variations and inconsistencies observed in its use, especially when estimating ages 15-17 years and 18 years, respectively.While some thought that 15-17 year olds have 28-29 teeth, others thought that they should have 26 teeth and by 20 years old, one should have 32 teeth. Many expressed challenges, especially with counting teeth in the mixed dentition, because at times they could not differentiate between the primary and secondary dentition. This therefore calls for re-evaluation of these processes because unclear guidelines and arbitrary practices, if allowed to continue can have dire consequences for the protection of children and adolescents under the judicial process.

The perceptions of the participants towards their practice were quite revealing. Some felt that the current practice of using teeth to estimate age is a good scientific method which is ideal for the Ugandan setting. They perceived it as an easy method, reliable, considerably cheap and thus appropriate for use in this setting. Some went ahead to assert that it is the only procedure they utilize and have not encountered any complaints so far. This finding was quite surprising considering that there are multiple factors that affect the process of tooth eruption[24] and thus would potentially bias the process. On the other hand, others felt that it is a rudimental method prone to error and thus needs to be combined with other approaches. This finding is in corroboration with the international guidelines that emphasize a multidisciplinary approach[7,13]. In addition, there is also a lot of literature showing that good results from age estimation practices involve a combination of diverse age predictors and the most commonly used of which are dental and skeletal parameters[9].

Conclusion

We recognise that the dentition, especially the third molar eruption, is popularly used to estimate the age of juveniles undergoing judicial proceedings in Uganda. Although many of the key informants felt that it is not a very accurate method and thus should be used in combination with other approaches. We also realise that none of the methods mentioned can be used to prove that a person has reached the age of majority.

In view of these findings, we felt that the current practice of age estimation in the country does not fully comply with international guidelines. There is a need for improvement and standardisation of the practice in order to conform to international guidelines. We thus suggest that a number of strategies be adopted, including the use of more robust methods like third molar development, a multidisciplinary approach, and an emphasis on combining methods in order to increase accuracy and promote fairness in the process.

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