Development of a Web-Based Nationwide Korean Pediatric Dental Sedation Registry

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Objective: *Finding a balance between sedation efficacy and safety remains an ongoing challenge. In children, the risk of sedation-related complications is relatively high. It is of utmost importance to determine the factors related to improved overall sedation outcomes. However, most previous reports have been based on small samples at single institutions. The Korean Academy of Pediatric Dentistry (KAPD) developed a Korean Pediatric Dental Sedation Registry using a web-based platform.* ***Study design:*** *Specialists in pediatric dental sedation selected the itemized list included within the registry through an extensive literature review. The web-based registry was built into the KAPD homepage to facilitate easy access to the sedation data. All teaching and university hospitals agreed to participate in the Korean Pediatric Dental Sedation Registry.* ***Conclusion:*** *This is the first attempt to collect sedation data on a nationwide scale in the field of pediatric dentistry. The sedation database established with the registry may facilitate standardizing and improving pediatric dental sedation clinical practices.*

Key words: *Anesthesia, Dental; Conscious Sedation; Database; Dental Anxiety; Pediatric Dentistry; Registries*

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INTRODUCTION

Sedation is frequently used during dental treatment for uncooperative pediatric patients. Sedation often has positive consequences for patients undergoing dental treatments, but several life threatening complications associated with dental sedation have been reported over the past two decades.[1] Although the incidence of life threatening complications is low, the complication rate in pediatric dental sedation is the highest among procedural sedation fields.[2]

The ultimate goal of dental sedation is to maximize sedation outcomes and minimize adverse outcomes. Theoretically, high quality sedation is possible from the point of view of patients and guardians if we collect information about procedural, patient and practitioner factors associated with improving outcomes and reducing complications in pediatric dental sedation. However, most studies investigating the effectiveness and safety of pediatric dental sedation have been conducted using a small number of patients.[3,4] In addition, the parameters affecting sedation outcomes are not standardized among different hospitals. Therefore, there is an increasing need to create a standardized platform for collecting clinical and demographic data to investigate the factors related to favorable sedation outcomes.

Ideally, a study should have a sufficient number of subjects to generalize from the results to varying populations, sedation with varying sedatives and practitioners with varying sedation experiences. To date, the management of pediatric dental sedation has not been evaluated in Korea on a large scale, although educational programs in pediatric dental sedation have been implemented by

the Korean Academy of Pediatric Dentistry (KAPD). Therefore, it is clinically useful to collect and analyze prospective observational data on pediatric dental sedation nationwide. However, to date, no such study has been conducted.

The registry of clinical data is widely accessed to analyze the incidence of disease and solve questions regarding the management of various medical diseases. With the introduction of big data management techniques, it is feasible to extract relevant information from seemingly unrelated data. Therefore, we developed the Korean Pediatric Dental Sedation Registry using a web-based platform embedded within the homepage of KAPD to collect nationwide pediatric sedation data with the hope that the data collected will help provide information to enhance safe pediatric sedation practices.

MATERIALS AND METHOD

A committee of sedation research and education was established within KAPD. The committee members consisted of 9 professionals: 5 pediatric dentists, 2 anesthesiologists in a dental university hospital, and 2 pediatric dentists in private practice. All committee members had extensive experience in pediatric sedation. The initial meeting to establish the Korean Pediatric Dental Sedation Registry was held in January 2014. In the first meeting, members agreed to develop a pediatric dental sedation registry web page on a national scale. Before making a web-based platform for the pediatric sedation registry, the committee extensively reviewed the available literature to create an itemized list included in the sedation registry. The registry inclusion criteria were based on the possibility of assessing pre-sedation evaluation, overall sedation effectiveness and sedation-related complications. Data elements were selected after all committee members agreed to their inclusion in the registry.

After selecting the elements of data to be included in the registry, we developed a web-based platform to allow the entry of sedation data online. The web-based platform was developed so that sedation data could be recorded anonymously, ensuring confidentiality for all patients treated under sedation. The web-based platform of the pediatric sedation registry was embedded into the homepage of KAPD as a submenu, thereby enabling all pediatric dentists, as members of KAPD, access to the pediatric sedation registry (Fig. 1). This platform is also accessible on other electronic devices, such as tablet PCs, smartphones, and smart Pads. Accessibility was facilitated by allowing connection into the registry using nearly any type of electronic device that could access the internet. Data can be accessed and stored in the registry only after logging onto the KAPD homepage. Data are arranged around each identification (ID) number, which is entered into the homepage. In addition, users can use the data files formatted using Excel for personal data analysis.

Nationwide clinical and demographic data were recorded beginning in June 2015. An overview of clinical and demographic data in the pediatric sedation registry is provided in Table 1. Under the guidance of KAPD, all teaching and university hospitals with the personnel and equipment for pediatric dental sedation agreed to participate in collecting pediatric dental sedation data with the use of a web-based tool. Data on pediatric dental sedation will be collected through an electronic web page continuously on a large scale. The sedation committee will identify sedation practices and analyze factors affecting overall sedation outcomes from big data related to pediatric dental sedation at a later date.

Table 1. Overview of parameters included in the pediatric sedation registry

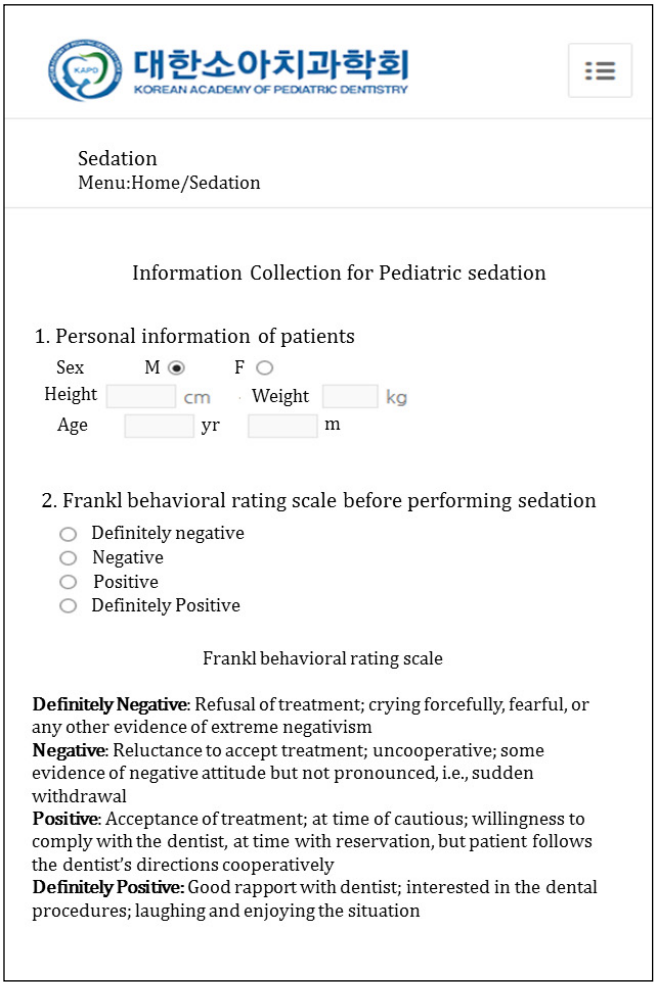
Category	Parameters
Demographics	Age, weight, height, the factors to determine sedation
Level of patient cooperation	Frankl Behavioral Rating Scale [11]
Pre-sedation assessment of patient medical status	Medical history, drug history, current history of URI infection, airway evaluation
Sedative drugs	Types of drug combinations, administered doses of sedative drugs, routes of administration, onset time of sedation drugs
Dental treatment	Time of sedation, types of dental treatment
Monitoring during sedation	Monitoring methods, monitoring persons
Sedation-related complications	Existence of sedation-related adverse events during sedation, and types of adverse events based on the criterion suggested by the Pediatric Sedation Task Force Team with slight modifications[12]
Sedation outcomes	Overall behavior/responsiveness to dental treatment [7]
Patient medical status after sedation	Time to transfer to the recovery room, occurrence of sedation-related adverse events after sedation, types of adverse events based on criterion suggested by the Pediatric Sedation Task Force Team with slight modifications [12], discharge criteria

DISCUSSION

Sedation carries an inherent risk for adverse outcomes. The basis of good clinical practice for pediatric dental sedation is to balance efficacy and risk. Previous reports have shown that during sedation, serious complications develop most frequently in the area of dentistry.[2] To date, the exact incidence and causes of risks related to pediatric dental sedation remains unclear. Despite widespread use of sedation for dental treatment in children, there have been few reports investigating factors related to sedation outcomes and risks in pediatric dentistry. Most studies concerning pediatric sedation have focused on the medical area of pediatric procedural sedation.[2,5,6] Therefore, the sedation data collected from the registry may provide insight into patients with a high risk of developing complications.

The Korean Pediatric Dental Sedation Registry aimed to create a clinical practice database regarding pediatric dental sedation from which information concerning pediatric dental sedation outcomes may be assessed every two years and the results announced to all KADP members at an annual conference. To the best of our knowledge, this is the first sedation registry established in the field of pediatric dentistry. Although sedation is widely used in pediatric dentistry in Korea, dental sedation practices for pediatric patients are based on multiple parameters, such as individual sedation practitioner experience, preferences for specific sedation drugs and practice. The lack of consensus regarding good clinical practice for pediatric dental sedation requires a large-scale effort, which cannot be determined by a single institution. With the registry, sedation-related data will

Fig. 1. The web-based platform for the pediatric sedation data registry. This figure was captured from the web page for entering sedation data. In this figure, the Korean contents of this homepage was translated to English. The web page is embedded in the homepage of The Korean Academy of Pediatric Dentistry and written in Korean. The web address for entering sedation data into the registry is: (http://www.kapd.org/sedation_kr/). This web page is also available on any type of electronic device that has access to the internet. Data in this web page can be entered through mobile devices.



be collected by pediatric dentists with diverse sedation experiences and protocols on a large scale. The database collected from this registry may suggest evidence regarding pediatric sedation. This may overcome some of the limitations of previous studies, which had small sample sizes and included few practitioners. This may also help pediatric dentists to achieve consensus regarding good clinical practice for pediatric sedation.

Data regarding the combination and dose of sedative drugs and the presence of additional sedative drugs will be collected in the registry. These data may give an estimate of drug-related factors influencing sedation outcomes when to apply to the criterion assessing overall sedation outcomes.[7] They may also provide an estimate of drug-related factors closely associated with adverse events during the post-sedation period. Pediatric dental sedation is common in Korea. If sedation data is collected for several years on a nationwide scale, it will yield a considerable amount of information, from which efforts may be focused toward determining parameters to maximize sedation outcomes while minimizing risk.

In the registry, we included an itemized list in the pre-sedation assessment section to evaluate and assess general conditions, medical history, and physical examination results. Included in this list is the assessment of a patient's airway prior to sedation. Patients with airway problems may develop respiratory compromise during sedation. These complications may be more prominent in children, as they have small airways with relatively larger tongues, which are more prone to disrupting airway patency.[8] Therefore, we subdivided this section to provide a more thorough assessment of patients' airways. Data regarding patients' airways prior to sedation may allow us to investigate the effects of the airway on sedation outcomes on a large scale. This is particularly important considering that large cohort studies investigating airway-related factors and their effect on sedation outcomes have not yet been conducted in the area of pediatric dentistry.

There have been reports describing various combinations of sedative drugs used in pediatric dental sedation.[9,10] This is also true for pediatric dentists in Korea. With the use of the web-based sedation registry, it may be helpful to standardize the evaluation of a patient's physical status prior to sedation and report sedation-related adverse events, as suggested by the pediatric sedation task force team. In addition, the effect of sedation factors on overall sedation outcomes can be estimated from standardized datasets, while minimizing bias.

Additionally, sedation providers who use the web-based platform to enter sedation data can track this data at any time and create their own sedation database, as the collected data is sorted and tracked using the ID entered to log onto the KAPD homepage. In addition, sedation data recorded through the web-based platform will eventually make a significant contribution on a nationwide scale. If sedation providers continually enter data into this registry, they may be accustomed to sedation-related didactics and essential factors to assess medical conditions prior to sedation, monitor vital signs during sedation and discharge patients from the hospital after sedation. This may pave the way toward standardizing sedation practice nationwide. It is also expected that international research on this issue may be facilitated with slight modifications of this web-based platform.

CONCLUSION

Since the registry of Korea Pediatric Dental Sedation was only recently developed, the sedation database has not yet been established. However, the development of a national web-reporting platform is a step toward collecting pediatric dental sedation-related data. This registry may facilitate good clinical practice in pediatric dental sedation both nationwide and internationally.

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