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Adherence to Traumatic Brain Injury Guidelines in Turkey: A National Survey Study

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ABSTRACT

AIM: To discuss adherence to guidelines for the management of traumatic brain injury (TBI) in Turkey and physicians' attitudes toward standardized, evidence-based medical practice.

MATERIAL and METHODS: Survey questions were uploaded on the website www.surveymonkey.com and sent to the participants via e-mail or social media applications. The first 10 questions were about the participants' profiles, and the rest were purposed on presenting the physicians' viewpoint on and barriers against CPG adherence. SPSS version 17.0 for Windows was used for statistical analysis.

RESULTS: A total of 404 physicians (neurosurgeons, 59.5%; anesthesiologists, 16.7%; and emergency medicine practitioners, 23.9%) who were involved in TBI management were included in this study. Of them, 61.7% stated that they frequently adhere to the CPG recommendations for TBI. In their own experience, most of the respondents agreed that CPGs frequently improve outcomes. They stated that they would occasionally or never adopt recommendations with weak evidence. Physicians reached a consensus on individualizing the decision-making along with the CPG recommendations.

CONCLUSION: Of the participants, 61% adopted the CPG recommendations. The main barriers to the implementation of the CPGs are the strength of evidence levels and the affordability of the recommendations.

KEYWORDS: Traumatic brain injury, Guideline adherence, Clinical practice guidelines, Trauma management, Individualized therapy, Standardized treatment

ABBREVIATIONS: TBI: Traumatic brain injury, **CPG:** Clinical practice guideline, **BTF:** Brain Trauma Foundation, **CT:** Computerized tomography, **DECRA:** Decompressive craniectomy trial, **RESCUEicp:** Randomized Evaluation of Surgery with Craniectomy for Uncontrollable Elevation of Intracranial Pressure trial

INTRODUCTION

Traumatic brain injury (TBI) is a permanent or temporary impairment in physical, cognitive, and psychosocial brain functions due to trauma to the brain tissue via an external mechanical force (17). Its prognosis depends on several factors, some of which are modifiable and some are not. While age, trauma severity, many clinical parameters, and pathologies in cranial imaging cannot be modified at the time of presentation to the hospital, clinicians can work to prevent secondary – or delayed – insults to the brain (6). Such insults include hypotension, hypoxia, hyperthermia, seizure, hypoglycemia, and other pathologies.

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Clinical practice guidelines (CPGs) are documents that guide physicians in decision-making for patients by providing recommendations based on the available evidence (18). CPGs evolved as a consequence of the increasing number of cases and health expenditures, costly technological advancements, variations in patient management among different clinics and physicians, and the intention of delivering best practices to the patients (18). In the last 20 years, more than 30 evidence-based CPGs have been published by different national and international societies or groups (5). However, although these guidelines reflect the best practice recommendations with recent updates in the subject, several obstacles restrict the utility of and adherence to these guidelines (13). The Brain Trauma Foundation (BTF) guidelines for severe TBI care were the first CPGs published by any surgical specialty when they were released in 1996. They have been widely disseminated, and compliance with them is mandated for neurotrauma centers in the United States owing to their association with a 50% reduction in mortality from severe TBI.

Guideline adherence research is conducted to improve and enhance the applicability and efficacy of CPGs. This national survey study investigated the implementation of CPGs into clinical practice, barriers against adherence to these guidelines, and opinions on evidence-based medicine or personalized treatments for TBI management regarding a diverse group of physicians' considerations.

MATERIAL and METHODS

Ethical approval for this study was obtained from the Healthcare Sciences University Hamidiye Scientific Research Ethical Committee on February 23, 2021, with protocol number 69. The participants consisted of practitioners specializing in anesthesiology and reanimation, neurosurgery, or emergency medicine and play a role in the management of TBI patients.

The survey form was uploaded to www.surveymonkey.com, a website that facilitates a survey and obtains answers from the participants online. The survey is delivered to potential participants through a web link. The participants were determined from the neurosurgery, anesthesiology and reanimation, and emergency medicine departments of all the hospitals in each city. They were contacted *via* either e-mail, institutional phone numbers, social media applications, or personal mobile phone numbers. The survey website link was shared, and the participants were asked to answer the questions online. The first question of the survey stated informed consent to participate in the study.

Of the 32 questions, the first 10 were regarding information of the participants' current city, type of institution they are currently working in (public, private, education, city or university hospital or a medical center), practice subspecialty (anesthesiology and reanimation, neurosurgery, emergency medicine), affiliation (professor, associate professor, specialist, resident), number of years spent in the profession, number of TBI patient (except mild concussion) admissions to their institute per week, and their awareness and detailed knowledge of recent TBI guidelines. Currently habituated cities were categorized according to their corresponding region (Marmara, Aegean, Central Anatolia, Black Sea, Mediterranean, East Anatolia, Southeast Anatolia). According to the socioeconomic status score declared by the State Planning Organization in Turkey, if the sum of the score of cities in the region was greater than zero, the district was defined as developed, and if lesser than zero, it was defined as underdeveloped. Consequently, the Mediterranean, Marmara, Central Anatolia, and Aegean restricts represented developed regions, whereas the East Anatolia, Southeast Anatolia, and the Black Sea regions were designated as underdeveloped ones. The remaining questions were about the participants' personal opinions regarding the current practices in the management of TBI and the utility or feasibility of the current practice guidelines. The answers to the questions were prepared on a Likert scale involving the following answers: "always," "frequently," "occasionally," and "never."

SPSS version 17.0 for Windows was used for the data interpretation. Frequency analysis was conducted for nominal and ordinal questions, and the chi-squared test was conducted for gap analysis. Answers involving the Likert scale were coded as always: 3, frequently: 2, occasionally: 1, and never: 0. For variations between groups, the Mann–Whitney U-test and Kruskal–Wallis test were employed.

RESULTS

The survey was available for the participants between March 1 and May 1, 2021. It was sent to 2593 physicians, of whom 404 responded and were finally included in the analysis. Nominal data about the participants are presented in Figures 1 and 2. The specialties of the practitioners were distributed as follows: neurosurgery, 59.5% (n=239); anesthesiology and reanimation, 16.7% (n=67); and emergency medicine, 23.9% (n=96). Of them, 28.4% had experience in their specialty between 5 and 10 years, followed by 0 and 2 years (21.6%), 10 and 20 years (20.9%), 2 and 5 years (20.1%), and more than 20 years (9%). The majority of the respondents (60.1%) were working in a public or educational hospital, 23.6% in a university hospital, and 16.2% in a private hospital. The current home city was grouped as "developed" in 77.5% and "underdeveloped" in 22.5% of the participants. Of them, 56.7% stated that they were familiar with 1–3 CPGs, 10.4% were familiar with 3–5 CPGs, 5% were familiar with more than 5 CPGs, and 27.9% were not familiar with any of the guidelines. More than half of the practitioners (54.2%) stated that they frequently follow the literature for updates in TBI management, and 61.7% said that they frequently implement the CPG recommendations.

The respondents reported that the guidelines were beneficial in improving outcomes of the patients, in their own experience and consideration, "frequently" (n=218, 54.2%), "occasionally" (n=99, 24.6%), "always" (n=79, 19.7%), and "never" (n=6, 1.5%) (p=0.02). They also stated that they manage the patients solely based on the CPG recommendations "frequently" (n=223, 55.5%), "always" (n=90, 22.4%), "occasionally" (n=84, 20.9%), and "never" (n=5, 1.2%) (p=0.006). Emergency medicine practitioners believed that CPGs are helpful in improving outcomes more than other specialties (p=0.02);

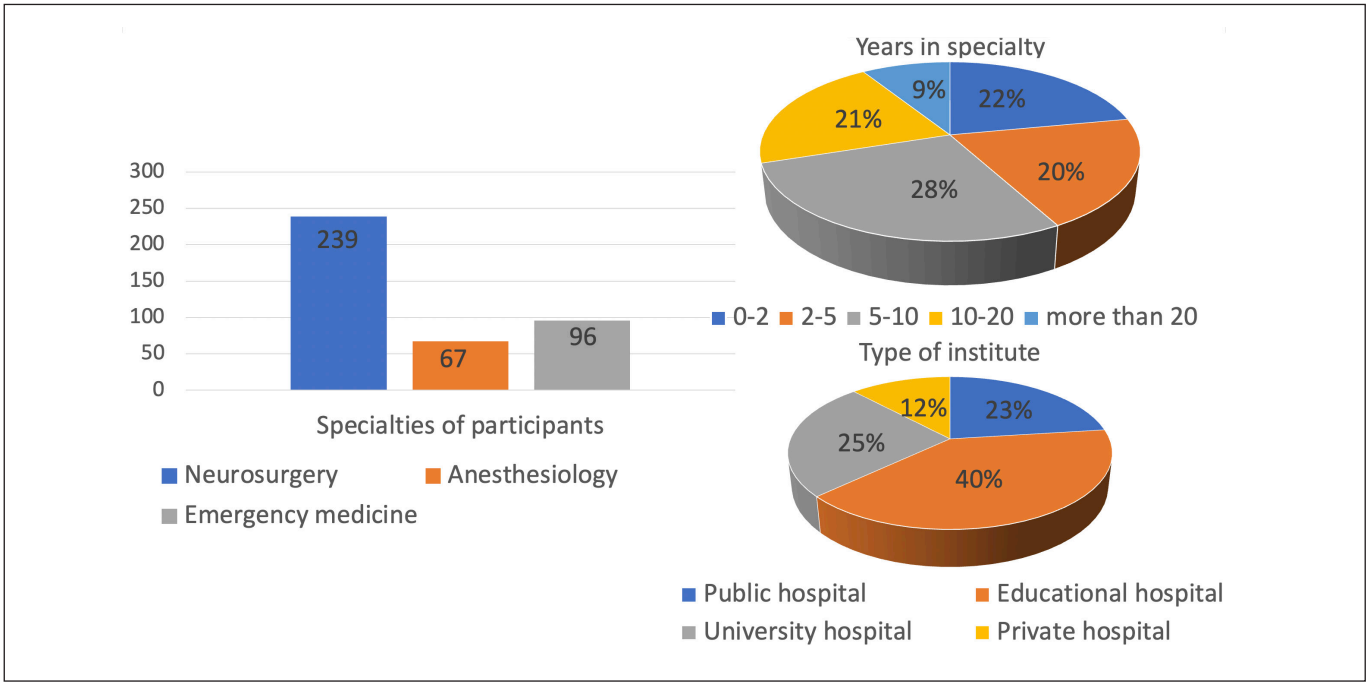

Figure 1: The participants' specialties and their years of experience in the specialty are presented, as well as the type of the institute where they are currently working.

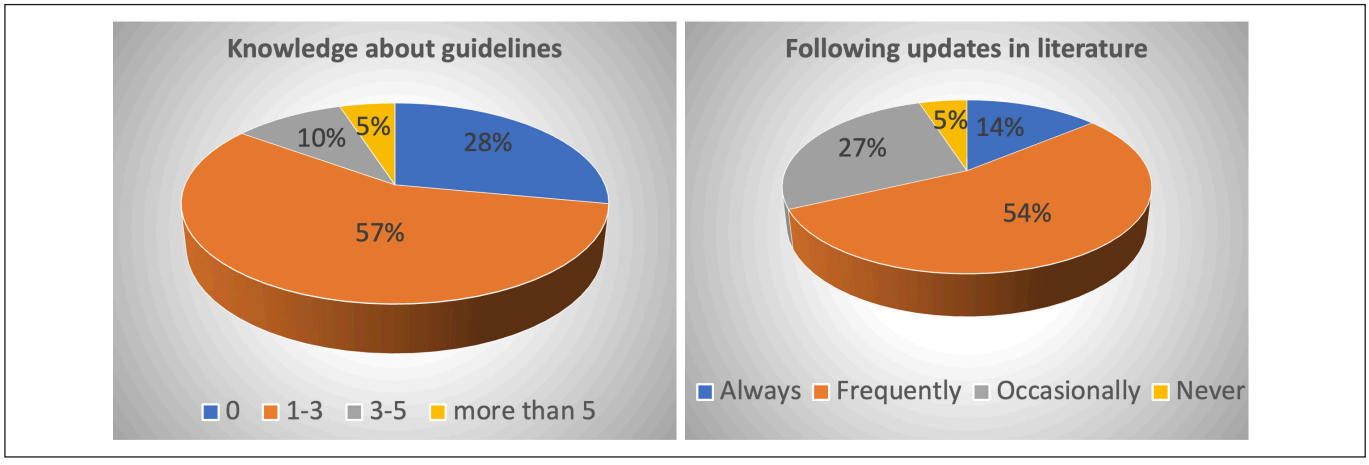

Figure 2: Number of guidelines on TBI that the participants know about with the frequency of following literature updates on TBI.

otherwise, no differences were observed between other variables.

As CPGs provide standardized recommendations supported by evidence, the respondents were asked to provide an opinion about the adequacy of evidence levels and the necessity for personalized treatments (Figure 3). They considered that the evidence levels were adequate for applying the recommendations "frequently" (n=213, 53%), "occasionally" (n=155, 38.6%), "always" (n=24, 6%), and "never" (n=10, 2.5%) (p=0.26). As lack of strong evidence and weakness of supportive measures for recommendations are significant problems in CPGs, the respondents reported that they would adopt recommendations with weak evidence "occasionally" (n=300, 74.6%), "never" (n=51, 12.7%), "frequently" (n=45, 11.2%), and "always" (n=6, 1.5%) (p=0.018). No statistically significant differences were observed between the variables. As the CPGs provide recommendations for large patient groups, the respondents were asked if individualized recommendations should be included in CPGs, and the responses were "frequently" (n=182, 45.3%), "always" (n=140, 34.8%), "occasionally" (n=79, 19.7%), and "never" (n=1, 0.2%) (p=0.03). Most physicians agreed with the importance of medical history and current physical condition in making modifications in the treatment of patients.

Monitoring using either invasive or non-invasive methods is an essential component in TBI management; therefore, the threshold levels for each parameter are provided in the CPGs. The participants were asked if they would prefer to insert an invasive monitor that is suggested to improve outcomes, even if the intervention carries a high risk for the patient's condition. The responses were "occasionally" (n=164, 40.8%), "never" (n=112, 27.9%), "frequently" (n=90, 22.4%), and "always" (n=36, 9%) (p=0.02). Interestingly, physicians with an experience ofmore than 20 years in their specialty considered monitoring in a standardized protocol distinct from individualized alterations (p:=0.04). Furthermore, the respondents agreed that the threshold levels may vary between individuals "frequently" (n=186, 46.3%), "always" (n=119, 29.6%), "occasionally" (n=88, 21.9%), and "never" (n=9, 2.2%).

The physicians were asked if the economic affordability of applying the CPG recommendations were adequate (Figure 4). The responses were "frequently" (n=106, 26.4%), "occasionally" (n=157, 39.1%), "always" (n=96, 23.9%), and "never" (n=43, 10.7%) (p<0.05). However, physicians in public hospitals were concerned about paucity in their institutes more than other groups. They reported that in their institute, the technological enrichments were sufficient for the implementation of recent guideline recommendations "frequently" (n=132, 32.8%), "occasionally" (n=131, 32.6%), "never" (n=86, 21.4%), and "always" (n=53, 13.2%) (p<0.05).

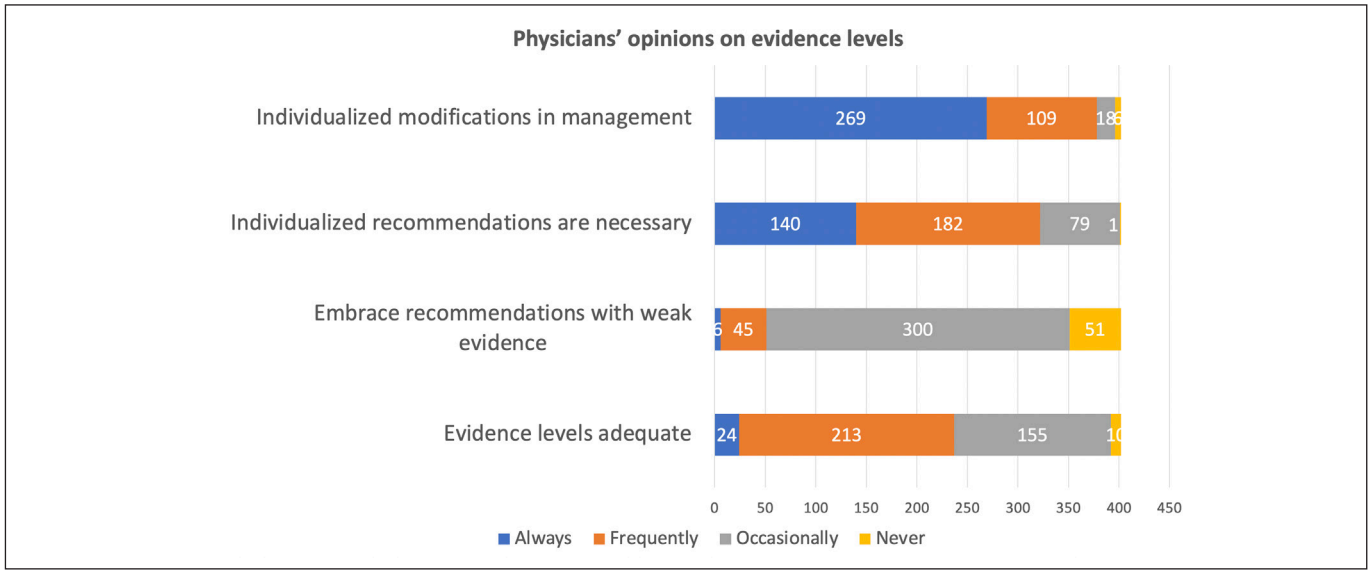

Figure 3: Opinions of physicians regarding the evidence levels of recommendations in the TBI guidelines with considerations of individualized and standardized treatment (p<0.05).

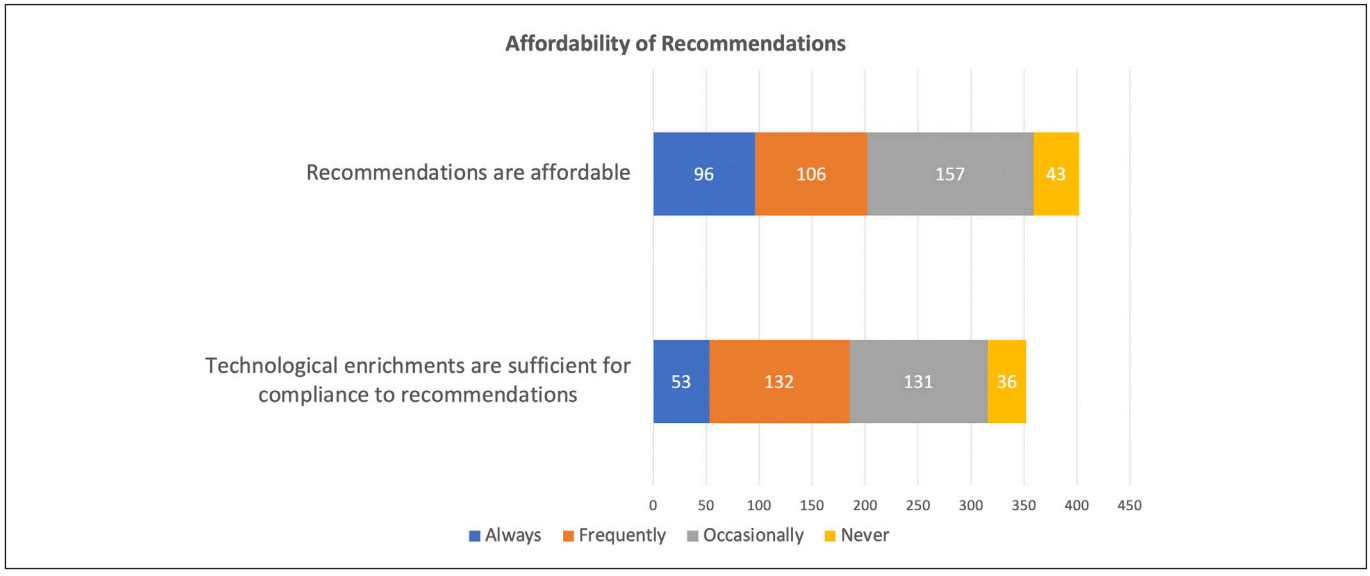

Figure 4: Opinions on economical affordability of recommendations in TBI guidelines (p<0.05).

On the other hand, respondents from university hospitals reported that the qualification of the institute they are currently working in is ideal for the application of the guidelines more than physicians working in other types of institutes. No statistically significant differences were observed in the number of TBI admissions to the institute.

DISCUSSION

CPGs are documents that guide physicians in decision-making and encourage compliance with best practices in certain medical conditions based on published evidence. They evolved as a consequence of the increasing health expenditures and number of patients, costly technologies, variation in patient management between clinics and practitioners, and the intention of delivering best practices to patients (18). In the case of severe TBI, the guidelines were developed as it was observed that undesirable practices were prevalent and might be corrected with the publication of evidence-based recommendations. In the last 20 years, more than 30 CPGs on TBI have been published (5). As for the development and advances of these evidence-based documents, it is necessary to put forth the adherence rates, barriers against the guideline implementation, and physicians' considerations on executing the recommendations. This study aimed to present the viewpoint of physicians in Turkey, who play a role in the management of TBI, on TBI guidelines and their concerns regarding the implementation of the recommendations.

It is well known that guideline-based approaches to TBI patients have reduced the variability of practice among practitioners and institutes along with a significant improvement in patient outcomes (8). The majority of the participants in our survey agreed that adherence to the guideline recommendations improves patient outcomes based on their own experience. In a study, the mortality rate decreased by 15% in patients older than 12 years who were suffering from severe TBI when the BTF guideline recommendations were implemented (7). Furthermore, Lee et al. suggested that implementation of more than 75% of the guideline recommendations was associated with lower mortality and morbidity rates (12). Of the respondents, 61% stated that they apply guideline recommendations in their clinical practice. In the literature, adherence to guideline recommendations varies. In a study conducted on 185 TBI patients, the rate of adherence to the BTF guidelines was found to be 71.4% (12). In a systematic review study, recommendations including conservative therapy were implemented more than those involving surgical interventions. The rate of adherence to surgical intervention recommendations was reported to be only 14% (10). Another study concluded that the rate of adherence to intracranial monitorization and surgical intervention recommendations was 30%, whereas it was 79% for CT scanning and prophylactic antiepileptic drugs (2). A survey study by Hirschi et al. demonstrated that 15.89% of physicians were implementing guideline recommendations depending on their subspecialty and the number of trauma patients admitted to their institutes (8).

In the 4th edition of the "Management of Severe TBI" guidelines by BTF, majority of the included studies enrolled broad patient populations with diverse characteristics (1). It has been stated that best practices should be performed considering the patient as a whole, and decision-making should include a synthesis of coexisting pathologies and morbidities of the patient along with TBI. Accordingly, our respondents agreed with the consideration of the medical history and current status of the patients when evidence-based treatments are to be administered. Although treatment standardization is one of the missions of guideline-based approaches to deliver best practices to every patient in every circumstance, each patient should be individually evaluated in decision-making. For example, DECRA and RESCUEicp are two important trials investigating the outcomes of decompressive craniectomy (3,9). However, in these two studies, patients older than 65 years were excluded. In another study, 44 patients older than 66 years underwent decompressive craniectomy for unilateral or bilateral brain edema, and the mortality rate was found to be 77% (4). Furthermore, anticoagulants and antiplatelet drugs are commonly used in the elderly population; therefore, invasive monitoring should be judiciously considered in determining the possible harm and benefit for the patient (15).

The level of evidence for the recommendations and quality of CPGs has a significant impact on the guideline implementation. Although CPGs include the most recent data on the consequent topic, most recommendations have a low level of evidence due to a lack of a sufficient number of samples, subjective inclusion and exclusion criteria that may be influenced by the physician or patient preference, the heterogeneity of sample groups, the high level of bias, and an insufficient number of high-quality studies (16). A study concluded that only 9% of the evidence provided in the CPGs of neurosurgical practice are class I, and 24% of the recommendations are presented as level 1 (16). Cnossen et al. suggested that recommendations based on a higher evidence level are implemented more compared with weak evidence level based recommendations (2). One of our questions in the survey was asking if the physicians were eager to implement recommendations with weak evidence levels, and the majority answered "occasionally" or "never." Evidently, the level of evidence affects physicians' assessment and confidence in the CPGs; therefore, it may be assumed that the implementation of recommendations may be increased by increasing the evidence levels of the recommendations.

The cost-efficiency and accessibility of recommended management modalities are important factors for the CPG implementation. In Turkey, a middle-income country, healthcare services are provided in different types of hospitals, such as public, university, educational, and private hospitals. In our study, physicians suggested that the affordability of management modalities was frequently adequate and technological advancements were frequently acceptable in the institute where they were working. On the other hand, affordability was a concern in public hospitals compared with other types of hospitals. Furthermore, no differences were observed between developed and underdeveloped cities regarding these questions, contrary to existing literature. The implementation

of guideline recommendations is suggested to be challenging for low-income countries and underdeveloped cities due to a limited number of intensive care units, lack of equipment, and technological devices with insufficient numbers of caregivers (11,14). For example, guidelines suggest performing decompressive craniectomy when conservative therapy is futile for intracranial hypertension. However, in underdeveloped countries, decompressive craniectomy is mostly performed when patients have an abnormal CT scan due to a lack of intracranial pressure monitoring devices and equipment for lowering intracranial pressure (14).

This study has several limitations that need to be acknowledged. As this is a survey study including the opinions of physicians, this may not reflect the actual adherence rates to the CPGs in TBI. Thus, further studies are warranted to investigate each treatment or monitor subtopics quantitatively. This study only reflects the opinions of the practitioners who provide care to TBI patients. Furthermore, the respondents included emergency medicine and anesthesiology practitioners along with neurosurgeons. The interventions that each subspecialty performs are different from each other; therefore, this may bring forth bias to the study, especially for the questions involving invasive monitoring of the patients.

CONCLUSION

This study was conducted to determine adherence to CPGs in TBI by healthcare providers involved in the management of TBI in Turkey. We concluded that 61% of the practitioners adopt evidence-based guideline recommendations. Furthermore, they adopt a personalized approach considering patients' status and harm–benefit ratio. Moreover, the level of evidence and affordability of recommendations were found to be crucial determinants for the implementation of CPGs.

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AUTHORSHIP CONTRIBUTION

Study conception and design: BS
Data collection: BS, DS
Analysis and interpretation of results: BS
Draft manuscript preparation: BS, DS
Critical revision of the article: GWJH
Other (study supervision, fundings, materials, etc...): GWJH
All authors (BS, DS, GWJH) reviewed the results and approved the final version of the manuscript.

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