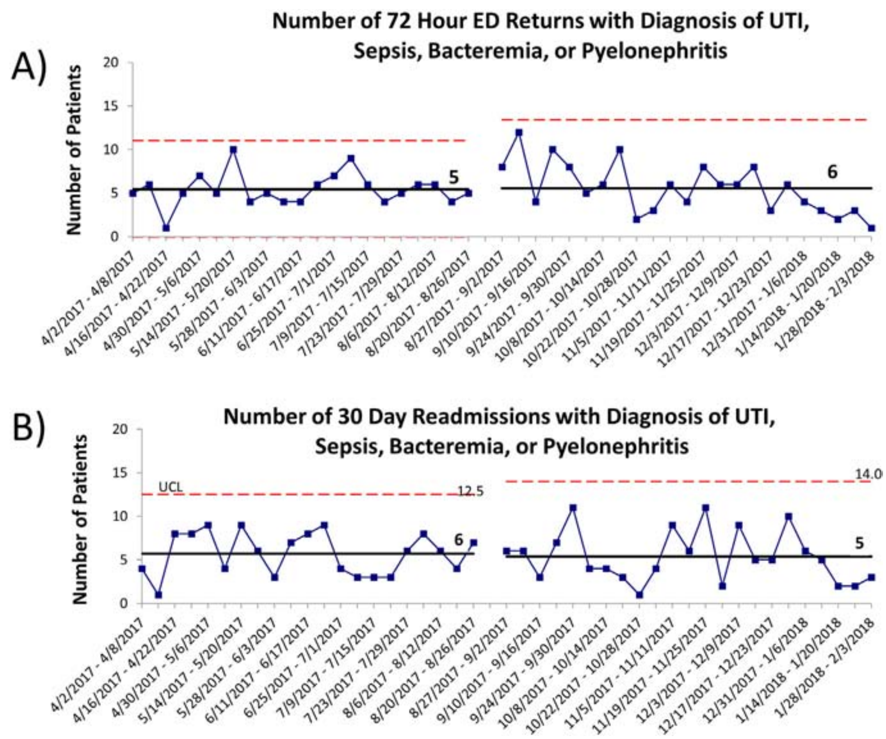

Fig. 3. The number of 72-hour Emergency Department returns per week (A) (Mann-Whitney *U* test, $p = 0.915$) and 30-day readmissions per week (B) (*t*-test, $p = 0.694$) with diagnosis of urinary tract infection (UTI), sepsis, bacteremia, or pyelonephritis was not significantly altered post-intervention.

[2] Hooton TM, Gupta K. Acute simple cystitis in women. In: Bloom A, editor. Waltham, Mass.: UpToDateUpToDate; 2018https://www.uptodate.com/contents/acute-simple-cystitis-in-women, Accessed date: 20 December 2018.
[3] Hooton T. Acute simple cystitis in men. In: Bloom A, editor. Waltham, Mass.: UpToDate; 2018https://www.uptodate.com/contents/acute-simple-cystitis-in-men, Accessed date: 20 December 2018.
[4] Hooton TM, Gupta K. Acute complicated urinary tract infection (including pyelonephritis) in adults. In: Bloom A, editor. UpToDate. Waltham, Mass.: UpToDate; 2018https://www.uptodate.com/contents/acute-complicated-urinary-tract-infection-including-pyelonephritis-in-adults, Accessed date: 20 December 2018.
[5] Humphries RM, Bard JD. Point-counterpoint: reflex cultures reduce laboratory workload and improve antimicrobial stewardship in patients suspected of having urinary tract infections. J Clin Microbiol 2016;54:254–8 Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4733168/. (26659213).
[6] Jones CW, Culbreath KD, Mehrotra A, Gilligan PH. Reflect urine culture cancellation in the emergency department. J Emerg Med 2014;46:71–6 Available from: https://www.clinicalkey.com/service/content/pdf/watermarked/1-s2.0-S0736467913009992.pdf?locale=en_US. (24140018).
[7] Fok C, Fitzgerald MP, Turk T, Mueller E, Dalaza L, Schreckenberger P. Reflex testing of male urine specimens misses few positive cultures may reduce unnecessary testing of normal specimens. Urology 2010;75:74–6 Available from: https://www.clinicalkey.com/service/content/pdf/watermarked/1-s2.0-S0090429509025278.pdf?locale=en_US. (19914703).
[8] Yin P, Kiss A, Leis JA. Urinalysis orders among patients admitted to the general medicine service. JAMA Intern Med 2015;175:1711–3 Available from: https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2429104. (26280990).
[9] Pallin DJ, Ronan C, Montazeri K, Wai K, Gold A, Parmar S, et al. Urinalysis in acute care of adults: pitfalls in testing and interpreting results. Open Forum Infect Dis 2014;23 Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4324184/. (25734092).
[10] Leis JA, Gold WL, Daneman N, Shojania K, McGeer A. Downstream impact of urine cultures ordered without indication at two acute care teaching hospitals. Infect Control Hosp Epidemiol 2013;34:1113–4 (24018932).
[11] Lee MJ, Kim M, Kim NH, Kim CJ, Song KH, Choe PG, et al. Why is asymptomatic bacteriuria overtreated?: a tertiary care institutional survey of resident physicians. BMC Infect Dis 2015;15:289 Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4514993/. (26209977).
[12] Lin E, Bhusal Y, Horwitz D, Shelburne SA, Trautner BW. Overtreatment of enterococcal bacteriuria. Arch Intern Med 2012;172:33–8 Available from: https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/1108639. (22232145).
[13] Trautner B, Cope M, Cevallos M, Cadle R, Darouiche R, Musher D. Inappropriate treatment of catheter-associated asymptomatic bacteriuria in a tertiary care hospital. Clin Infect Dis 2009;48:1182–8 Available from: https://academic.oup.com/cid/article/48/9/1182/407035. (19292664).
[14] Silver SA, Baillie L, Simor AE. Positive urine cultures: a major cause of inappropriate antimicrobial use in hospitals? Can J Infect Dis Med Microbiol 2009;20:107–11 Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2807252/. (21119801).
[15] Schulz L, Hoffman RJ, Pothof J, Fox B. Top ten myths regarding the diagnosis and treatment of urinary tract infections. J Emerg Med 2016;51:25–30 Available from: https://www.clinicalkey.com/#!/content/playContent/1-s2.0-S0736467916001220?returnurl=null&referrer=null. (27066953).

Emergency department visits for chemical substance-related injuries

The increasing use of chemicals worldwide has led to an increase in the incidence of chemical accidents [1]. Acute exposure to chemicals can be fatal and usually necessitates emergency treatment [2,3]. Although large- and small-scale chemical accidents frequently occur [4], studies on human injuries from chemical exposure are limited, including the population who are usually exposed to harmful chemicals. Hence, this study aimed to analyze the types and characteristics of chemical injuries by analyzing patients who visited university hospitals due to acute exposure to chemical substances.

This study enrolled patients unintentionally injured by acute exposure to chemical substances among those who visited the emergency departments of Soonchunhyang University Gumi Hospital and Ulsan University Hospital in South Korea between January 2007 and December 2016. Both Gumi and Ulsan have high distribution of chemical use and high density of industrial complexes. Medical records were retrospectively reviewed to collect data on sex, age, body areas exposed to the chemical, exposure mechanisms, diagnosis, disposition, and kinds and types of the chemical substances.

A total of 828 patients were included in the cohort. Of these, 708 (85.5%) were men, and 120 (14.5%) were women. The mean patient age was 38.01 years (standard deviation: 11.83 years). There were 245 patients (29.6%) in their 30s, followed by 227 patients (27.4%) in their 20s, and 202 patients (24.4%) in their 40s (Table 1). There were 29 types of chemicals whose components were identified. The most common chemical that the patients were exposed to was fluoric acid (328 individuals, 39.6%), followed by paint (31 individuals, 3.7%), thinner (22 individuals, 2.7%), magnesium (21 individuals, 2.5%), sulfuric acid (21 individuals, 2.5%), nitric acid (20 individuals, 2.4%), trimethylbenzene (18 individuals, 2.2%), and adhesive (14 individuals, 1.7%). The type of chemicals was not identified in 233 individuals (28.1%) (Table 2).

Regarding the types of chemicals, the most common was liquid (442 individuals, 53.4%), followed by gas (327 individuals, 39.5%), solid (40 individuals, 4.8%), gel (11 individuals, 1.3%), and complex type (7 individuals, 8%) (Table 3). The most frequently exposed body area was the respiratory tract (261 individuals, 31.5%), followed by the eyes (231 individuals, 27.9%), hands (71 individuals, 8.5%), face (39 individuals, 4.7%), lower extremity (31 individuals, 3.7%), upper extremity (29 individuals, 3.5%), central nervous system (17 individuals, 2.0%), feet (15 individuals, 1.8%), neck (6 individuals, 0.7%), gastrointestinal tract (6 individuals, 0.7%), trunk (3 individuals,0.4%), and head (2 individuals, 0.2%). Complex area exposure accounted for 14.1% (117 individuals) of all cases (Table 4).

Regarding mechanisms of injury, the most common was splash (485 individuals, 58.6%), followed by inhalation (301 individuals, 36.4%), blunt trauma (24 individuals, 2.9%), ingestion (7 individuals, 0.8%), explosion (6 individuals, 0.7%), and complex mechanism (4 individuals, 0.5%) (Table 5).

Chemical poisoning leads to various health problems and even deaths worldwide. Chemical injuries result from various mechanisms and also progress faster than other injuries. Chemical injuries are mainly work related and result from spraying or splashing [5]. Moreover, although chemical burns account for a small number of the total cases of burns, they have high mortality and morbidity rates [6]. In addition, chemicals can cause toxic reactions and can be fatal to the human body if inhaled [6]. Chemicals also frequently cause eye injury and can result in blindness and local injuries [7]. In this study, eye exposure accounted for a high proportion of mechanism of injury (27.9%). Given that the pathophysiology of chemical burns may vary from that of other burns, it is important to recognize and treat them at an early stage [8]. Moreover, chemical burns persist as long as the chemical remains on the skin [9]. Chemical substances in a gas form are more easily disseminated than those in solid or liquid form and pose a great risk to many people when they are released [1]. In this study, the most common chemical substance that caused poisoning was hydrofluoric acid, and the respiratory tract was the most commonly exposed organ (Tables 2, 4).

Table 1
General characteristics of the patients.

Demographic variables	Total (n = 828)
Age	
Range	19–82
Mean (SD[a])	38.01 (11.83)
Sex	
Male	708 (85.5%)
Female	120 (14.5%)
Age group	
10–20	9 (1.1%)
20–30	227 (27.4%)
30–40	245 (29.6%)
40–50	202 (24.4%)
50–60	111 (13.4%)
60–70	19 (2.3%)
70–80	14 (1.7%)
80–90	1 (0.1%)

[a] SD: standard deviation.

This study is valuable in that it shows the kinds and types of various chemicals causing human injuries, the exposure routes, and the most commonly exposed areas. In many cases of chemical exposure, there are many complex chemicals involved and no antidote; thus, it is difficult to treat them at an early stage. Therefore, it is important to identify the kinds of chemicals, the mechanisms of injuries, and to establish treatment principles [6,10]. Physicians in the emergency department

Table 2
Exposed chemical substances.

Exposed chemical materials	Total (n = 828)
Hydrofluoric acid	328 (39.6%)
Paint	31 (3.7%)
Thinner	22 (2.7%)
Magnesium	21 (2.5%)
Sulfuric acid	21 (2.5%)
Nitric acid	20 (2.4%)
Trimethylbenzene	18 (2.2%)
Adhesive	14 (1.7%)
Sodium hydroxide	11 (1.3%)
Hydrochloric acid	11 (1.3%)
epoxy	11 (1.3%)
Toluene	10 (1.2%)
Potassium Hydroxide	8 (1.0%)
Acetic acid	7 (0.8%)
Hydrogen sulfide	7 (0.8%)
Acryl	6 (0.7%)
halon	6 (0.7%)
argon	6 (0.7%)
Sulfur dioxide	6 (0.7%)
aluminum	5 (0.6%)
Acetone	4 (0.5%)
Silicon	4 (0.5%)
Phosphoric acid	3 (0.4%)
Sodium hypochlorite	3 (0.4%)
Trichloroethylene	3 (0.4%)
Cement	3 (0.4%)
Normal hexane	2 (0.2%)
Polyester	2 (0.2%)
Nitrogen	2 (0.2%)
Unknown	233 (28.1%)

Table 3
Type of chemical substance.

Type of the chemical substance	Total (n = 828)
Liquid	442 (53.4%)
Gas	327 (39.5%)
Solid	40 (4.8%)
Gel	11 (1.3)
Complex (more than two)	7 (0.8%)
Unknown	1 (0.1%)

Table 4
Chemical substance exposure site.

Body areas exposed to the chemical	Total (n = 828)
Respiratory tract	261 (31.5%)
Eyes	231 (27.9%)
Hands	71 (8.5%)
Face (except eye)	39 (4.7%)
Lower extremity (except foot)	31 (3.7%)
Upper extremity (except hand)	29 (3.5%)
Central nervous system	17 (2.0%)
feet	15 (1.8%)
Neck	6 (0.7%)
Gastrointestinal tract	6 (0.7%)
Trunk	3 (0.4%)
Head	2 (0.2%)
Complex (involving more than two site)	117 (14.1%)

Table 5
Mechanisms of injuries.

Injury mechanisms	Total (n = 828)
Splash	485 (58.6%)
Inhalation	301 (36.4%)
Blunt trauma	24 (2.9%)
Ingestion	7 (0.8%)
Explosion	6 (0.7%)
Complex	4 (0.5%)
Other	1 (0.1%)

should be aware of the kinds of harmful chemicals and the types of exposure by which each chemical cause injury. Moreover, decontamination and appropriate treatment at an early stage are necessary in cases of chemical exposure.

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Environmental Health Center, Soonchunhyang University Gumi Hospital, Korea.

Sung Uk Cho, MD
Se Kwang Oh, MD*
Department of Emergency Medicine, Chungnam National University Hospital, Republic of Korea
*Corresponding author at: Department of Emergency Medicine, Chungnam National University Hospital, 282, Munhwa-ro, Jung-gu, Daejeon, Republic of Korea.
E-mail address: 13744@hanmail.net (S.K. Oh).

Hee Jun Shin, MD[1]
Han You Lee, MD[1]
Heajin Chung, MD[1]
Department of Emergency Medicine, Soonchunhyang University, Korea

Sung Yong Choi, Ph.D[2]
Environmental Health Center, Soonchunhyang University Gumi Hospital, Korea

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References

[1] Wyke S, Pena-Fernandez A, Brooke N, Duarte-Davidson R. The importance of evaluating the physicochemical and toxicological properties of a contaminant for remediating environments affected by chemical incidents. Environ Int 2014;72:109–18.
[2] Kassiri H, Feiz-Haddad MH, Ghasemi F, Rezaei M, Ghanavati F. An epidemiologic and demographic survey of poisoning in southwest of Iran. Middle-East J Sci Res 2012;12:990–6.
[3] Flanagan RJ, Rooney C. Recording acute poisoning deaths. Forensic Sci Int 2002;128:3–19.
[4] Chemistry Safety Clearing-house. CSC Registry from 2010 to 2015. Available from: http://csc.me.go.kr/accident/accidentInfoPList.do. [cited 2018 13. July].
[5] Spector J, Fernadez WG. Chemical, thermal, and biological ocular exposures. Emerg Med Clin North Am 2008;26:125–36.
[6] Palao R, Monge I, Ruiz M, Barret JP. Chemical burns: pathophysiology and treatment. Burns 2010;36(3):295–304.
[7] Baradaran-Rafii A, Eslani M, Haq Z, Shirzadeh E, Huvard MJ, Djalilian AR. Current and upcoming therapies for ocular surface chemical injuries. Ocul Surf 2017;15(1):48–64.
[8] Gneneswaran N, Perera E, Perera M, Sawhney R. Cutaneous chemical burns: assessment and early management. Aust Fam Physician 2015;44(3):135–9.
[9] Saydjari R, Abston S, Desai MH, Herndon DN. Chemical burns. J Burn Care Rehabil 1986;7(5):404–8.
[10] Moore K. Hot topics: chemical burns in the emergency department. J Emerg Nurs 2015;41:364–5.

[1] Department of Emergency Medicine, Soonchunhyang University, Korea.
[2] Environmental Health Center, Soonchunhyang University Gumi Hospital, Korea.

Optic nerve sheath diameter ultrasonography in differentiation of ischemic and hemorrhagic strokes

Dear Editor,

We were interested in the paper by Manouchehrifar et al. regarding the ultrasound measurement of the optic nerve sheath diameter (ONSD) to differentiate ischemic and hemorrhagic strokes [1].

First, we would like to congratulate the authors for their remarkable article because it is a really blinded study, in contrast with other papers on a similar topic, even if we would like to comment some aspects regarding the measurement of the optic nerve sheath diameter (ONSD) with ultrasound to define intracranial hypertension.

For their study, Manouchehrifar et al. performed all the measurements with B scan technique, that is mostly utilized to diagnose ocular diseases [2,3] but unfortunately is not sensitive enough in measuring the orbital structures, as it is affected by the so-called blooming effect [4-6]. This one is related to the lack of a standard sensitivity setting in performing B scan and should not be confused with the Doppler associated blooming effect. In case of B scan it means that, if we measure ONSD with a lower sensitivity setting, this will give bigger dimensions compared to the ones obtained with a raised sensitivity setting. This effect could be less important when we handle large lesions, but it could be deceptive if we suppose a difference inferior to 0.5 mm, as it happens in ONSD assessment.

Due to the aforesaid limits, in case of further studies, we would like to suggest to use the Standardized A Scan: this method makes such measurements objective and more precise, because it shows easily discernible high reflective spikes from the interface between arachnoid and subarachnoidal fluid, and it is also blooming effect free. For this reason, it also allows more accurate reference range values, that can be utilized worldwide, without the need of laboratory – related references setting [7-9].

Furthermore, although the following comment does not concern this article, we would like to point out that an increase in ONSD diameter does not automatically mean that there is an increase of intracranial pressure but it could be also due to the presence of an optic neuritis or an optic nerve meningioma. With A scan, it is possible to prove the real presence of intracranial hypertension with the “30 degree test” that consists in a measurement of the optic nerve with the patient looking to the lateral side. A decrease in the maximal diameter of at least 5% proves that the distension of the ONSD is caused by increased subarachnoidal fluid, as in case of intracranial hypertension [10-13].

Moreover, we would like to highlight how the probe should be used in order to obtain more reliable measurements. As we cannot determine exactly the gaze direction of the patient with closed eyes, in ophthalmology, during the ultrasound examination, the B or A scan probe is routinely used with open lids, utilizing methylcellulose and anesthetic drops. This allows to clearly visualize the eye, making the probe orientation much more reliable, avoiding errors in detecting gaze direction [14].

Lastly, we are aware that the term “transorbital” is often used in literature and it is usually accepted [15], but we would like to suggest to use the terms “transbulbar” or “orbital”, in case of optic nerve examinations with ultrasound, because the term “trans” is a Latin word that means “beyond” or “through” and the word “transorbital” could be misleading [16].

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Maddalena De Bernardo, MD, PhD
Livio Vitiello, MD
Nicola Rosa, MD
Department of Medicine, Surgery and Dentistry, “Scuola Medica Salernitana”, University of Salerno, Salerno, Italy.
E-mail address: mdebernardo@unisa.it.

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