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CORRECTION

Correction to: Emergency Glucagon: a Focused Review of Psychosocial Experiences of Rescue Drugs for Type 1 Diabetes

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The original version of our article "Emergency Glucagon: a Focused Review of Psychosocial Experiences of Rescue Drugs for Type 1 Diabetes" published online first on February 16, 2022, unfortunately contained a few errors and unclear language. We revised the article to address these errors and clarified language to provide an unbiased and accurate review of glucagon devices. Below is detailed information on the previous version and the subsequent changes in the corrected manuscript.

Reference removal. There were several places where references were included erroneously after formatting. To ensure all statements were adequately supported by the cited references, we removed superfluous references in the following sentences.

In the **Rescue/Emergency Glucagon Review** under **Injectable Glucagon** section:

Previous reference 16, the package insert for injectable glucagon, was removed from the sentence "While this injection has been shown to be a safe and effective way to treat severe hypoglycemia, the method of administration has some psychosocial barriers, such as fear, anxiety, and confusion [8]."

In the **Rescue/Emergency Glucagon Review** under **Nasal Glucagon** section:

Previous reference 30, (Rickels et al., 2016), was removed from the sentence "Typically, there are fewer failures when nonmedical personnel administer nasal glucagon than when they administer injectable glucagon [29•, 31]."

In the **Rescue/Emergency Glucagon Review** under **Preference** section:

Previous references 28, (Suico et al., 2020), and 30, (Rickels et al., 2016), were replaced with reference 32, (Beato-Víbora et al., 2019) in the sentence "Utilizing injectable glucagon can be problematic due to its administration requiring multiple steps, such as reconstitution, and having to be administered immediately after reconstitution because it is not stable in liquid form [32]."

Previous references 35 (Bailey et al., 2021) and 37 (Pieber et al., 2021) were removed from the sentence "While no published studies have directly assessed preferences between an FDA-approved autoinjector glucagon and the injectable glucagon, some studies suggest patients and caregivers prefer the autoinjector [34•, 36]."

In the **Hypoglycemia-Related Emotions and Experiences of People with Diabetes** section:

Previous reference 58 (Garza et al., 2018) was removed from the sentence "Research examining the psychosocial impact of new diabetes devices, such as continuous glucose monitors and hybrid closed-loop insulin delivery systems, may guide the evaluation of glucagon devices [56, 57, 59]."

The original article can be found online at https://doi.org/10.1007/s11892-021-01443-y.

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In the **Hypoglycemia-Related Emotions and Experiences of Caregivers** section:

Previous reference 60 (Anderbro et al., 2016) was removed from the sentence "Overall, parents generally report high levels of fear, depression, stress, and anxiety regarding severe hypoglycemia [13, 61]."

Previous reference 67 (Gonder-Frederick et al., 2006) was removed from the sentence "The association between higher parental FoH and the child's experience of severe hypoglycemic events is unclear; some studies found a significant association while others did not [68]."

Previous reference 73 (Noser et al., 2019) was removed from the sentence "Parents often reported grief and symptoms of depression at the time of their child's diagnosis and resurgences of grief during times of illness and hospitalization [72]."

Previous reference 30 (Rickels et al., 2016) was removed from the sentence "However, studies for the nasal and autoinjector glucagon have shown promise in eliminating the negative emotions related to glucagon delivery and use [29•, 31, 34•, 35–37]."

Reference addition. The original version of this article also erroneously left out an important reference, the Baqsimi package insert. The Baqsimi package insert is now included in the reference list and is used to support the following sentences.

In the **Introduction** section:

The intramuscular glucagon injection was first available to be prescribed in the USA in the 1960s, but only recently have pharmaceutical companies begun to develop new ways of administration [11, X].

In the **Rescue/Emergency Glucagon Review** under **Nasal Glucagon** section:

Recent innovation in glucagon development has led to nasal glucagon (NG), an effective and safe treatment for severe hypoglycemia in pediatric and adult populations with T1D [18, X].

Removing potentially biased language. As we corrected the references, we carefully reviewed and found several places where our statements were less clear than we intended. To ensure that we provided an unbiased and accurate review, we made wording changes to the following sentences:

In the **Introduction** section:

The original sentence read: "Additionally, the *frequency* of severe hypoglycemia is one of the most important factors associated with fear of hypoglycemia [4]." The word "frequency" was replaced with "history" to more accurately reflect the construct measured. The new sentence reads: "Additionally, a ***history*** of severe hypoglyecmia is one of the most important factors associated with fear of hypoglycemia [4]."

In the **Rescue/Emergency Glucagon Review** under **Injectable Glucagon** section:

The original sentence read: "There are currently two name brands of the glucagon emergency kit available, which are the Glucagon Emergency Kit (Eli Lilly and Co, Indianapolis, IN) and the GlucaGen Hypokit (Novo Nordisk A/S, Bagsværd, Denmark), and *can be administered either subcutaneously or intramuscularly* [8]." The latter part of this sentence was edited to clarify: "…and **is most commonly administered either subcutaneously or intramuscularly outside of clinical settings** [8]." to avoid confusion with previous discussion of an intravenous option for glucagon administration, which does not occur outside of clinical settings.

In the **Rescue/Emergency Glucagon Review** under **Nasal Glucagon** section:

The original sentence read: "Recent innovation in glucagon development has led to nasal glucagon (NG), an effective and safe treatment for *moderate to* severe hypoglycemia in pediatric and adult populations with T1D [18]." To be consistent with labeling and FDA approval, to the mention of moderate was removed from the latter portion of the sentence. The revised sentence reads: "… an effective and safe treatment for severe hypoglycemia in pediatric and adult populations with T1D [18]."

The original sentence read: "The NG is absorbed passively through the nasal mucosa and starts working within 15 min; *if the person experiencing a severe hypoglycemic event does not improve within 15 min, a second dose of nasal glucagon should be administered* [19]." to the latter portion of the sentence was removed, as the information – while correct – is proper instruction for all glucagon devices and we believed it created an issue of bias in the presentation of nasal glucagon. The revised sentence now reads: "The NG is absorbed passively through the nasal mucosa and starts working within 15 min [19]."

The sentence in the previous version: "However, PwD using nasal glucagon experience mild adverse events more frequently; > 30% experience watery eyes, nasal congestion, nasal itching, and runny nose [18, 32•]." was removed in its entirety. The information provided was correct, but we believe created an issue of bias in the presentation of different levels of detail instead of being consistent across information provided for all glucagon devices.

In the **Rescue/Emergency Glucagon Review** under **Autoinjector Glucagon** section:

The original sentence read: "These doses are administered as *either intramuscular or subcutaneous injections*; however, unlike the original injectable glucagon, the autoinjectors do not require any reconstitution, as the autoinjector glucagon pens are prefilled and ready to use." A portion of the sentence was corrected to be consistent with FDA guidelines for the autoinjector glucagon. The sentence now reads: "These doses are administered as *a subcutaneous injection only*…." The autoinjector glucagon

cannot be given intramuscularly per FDA guidelines and the package insert instructions.

The original sentence read: "There are currently two autoinjector glucagon pens available: the Gvoke HypoPen ***(1 mg/mL and 0.5 mg/mL)*** was approved by the FDA in 2019 and the Zegalogue Autoinjector ***(0.6 mg/mL)*** was FDA approved March of 2021 [11, 38]." The dosing information was moved to another section, where it fit better. The sentence now reads: "There are currently two autoinjector glucagon pens available: the Gvoke HypoPen was approved by the FDA in 2019 and the Zegalogue Autoinjector was FDA approved March of 2021 [11, 38]."

The original sentence read: "They are approved for pediatric patients at least 2 years old, and the dose is weight dependent [33]." This information was unclear, as autoinjectors have different doses and instructions for use depending on brand. The sentence now reads: "The Gvoke HypoPen is approved for adults (1mg/mL) and pediatric patients (0.5-1.0 mg/mL) at least 2 years old, and the dose is weight dependent for those up to 12 years of age [33]. The Zegalogue autoinjector is approved for adults and pediatric patients at least 6 years old and the standard dose is 0.6mg/ml [38]."

In the **Rescue/Emergency Glucagon Review** the second timepoint in **Figure 1**:

The original sentence read: "The first study to demonstrate the efficacy of nasal glucagon was published [18]." We believed this statement, while accurate, could create confusion between efficacy studies and other research. Thus, this sentence now reads: "The first *research* study to demonstrate….."

In the **Rescue/Emergency Glucagon Review** under **Preference** section:

The sentence in the previous version: "Reasons for this preference include NG being smaller, easier to store, shorter to prepare, ready to use, and easier to administer [39]." was removed in its entirety, as the sentence was not properly supported by the reference.

The original sentence read: "Mini subcutaneous doses of glucagon have been shown to be effective in treating mild and moderate hypoglycemia in adults (doses up to 300 μg, but 150 μg seems to be optimal) and treating mild hypoglycemia in children ages 2–15 (doses of 20–150 μg based on year of age) [43–45]." The original wording does not make it clear that mini dosing is not FDA approved and while the information originally given is correct, it does pose a risk to people utilizing this dosing information at home. The sentence now reads: "While not FDA approved, mini dosing of glucagon, or low doses of injectable glucagon, has shown promise in recent studies [43-45]."

In the **Conclusion** section:

The sentence in the previous version: "NG has also been shown to be faster, less complicated, and easier to administer." was removed in its entirety, as these statements have not been fully investigated in the referenced research articles.

The original sentence read: "People with T1D, their caregivers, and acquaintances prefer the NG over injectable glucagon according to a recent simulated administration study and a discrete choice experiment study [29•, 39]." The original sentence contained some unintentionally biased language given the current state of the literature on glucagon devices. The sentence now reads: "People affected by T1D seem to prefer the newer technologies over the traditional injectable glucagon [29, 34, 36, 39]."

The original sentence read: "While no published studies have directly assessed preferences between an FDA-approved autoinjector glucagon and the injectable glucagon, some studies suggest patients and caregivers would prefer the autoinjector [34•, 35–37]." The original sentence contained some unintentionally biased language given the current state of the literature on glucagon devices. The sentence now reads: "Though there are limited studies, preliminary evidence suggests PwD and their caregivers may prefer NG over the autoinjector [41, 42]."

The original sentence read: "Clinicians should be prepared to refer PwD for mental health needs when severe hypoglycemia and glucagon produce clinically significant negative emotions." This language erroneously left out a key word. The sentence now reads: "…when severe hypoglycemia and glucagon *experiences* produce clinically significant negative emotions."

The original sentence read: "It would be valuable for glucagon makers to also produce a simulation device for training." The inclusion of 'for training' was too broad, as there are studies that utilize simulation devices for in-clinic use. The sentence now reads: "…produce a simulation device for *at home use*."

In the Reference Section:

Reference number 25 was missing information (a number) at the end of the DOI which led to an error if using the DOI for searching. The reference is now: "Lowe RN, Trujillo JM. Intranasal glucagon: a new way to treat hypoglycemic emergencies. Ann Pharmacother. 2020;54(8):780–7. https://doi. org/ 10. 1177/ 10600 28020 905846."

An additional reference was added to the reference list: "Baqsimi [package insert]. Indianapolis, IN: Eli Lilly and Company; 2019."

The original article has been corrected.