

Review of Three Techniques Used in Teaching and Aiding Children in Swallowing Pills



Written by Marissa Harkness

August 25, 2020

1. Introduction: Children are not proactively taught how to swallow pills
 - 1.1. The importance of learning how to swallow pills
 - 1.2. The risks of tampering with medication
 - 1.3. The general benefits of pill swallowing intervention methods
2. Intervention methods used for teaching or aiding in swallowing of pills
 - 2.1. Instructional methods help some children learn a skill the way they learn to tie shoes
 - 2.2. Success in using a variety of head positioning techniques
 - 2.3. Success in using a pill swallow cup
3. Studies show success in teaching people how to swallow pills using a variety of techniques
 - 3.1. Studies conducted using scripted instructions
 - 3.2. Studies conducted using five different head positions
 - 3.3. Study conducted on the pill swallow cup
4. Conclusion
 - 4.1. Research matrix
 - 4.2. Instructional methods are the most effective way for a child to learn how to swallow pills
 - 4.3. Recommendation to conduct further research in this field

Cover image modified from [1]

1. Introduction: Children are not proactively taught how to swallow pills

Over 40% of the adult population in the United States struggles with or is unable to swallow pills [2], despite the majority of the population not having an inherent swallowing disorder [3]. This report examines methods of teaching children how to swallow pills which may have an impact on their pill swallowing success as an adult. In one study, the results showed that only 16% of children struggle with or are unable to swallow pills [4]. With only minimal modifications, the number was cut to 9% [4]. This significant statistical difference between the adult and child population with pill swallowing difficulties deserves further investigation and is the subject of this paper.

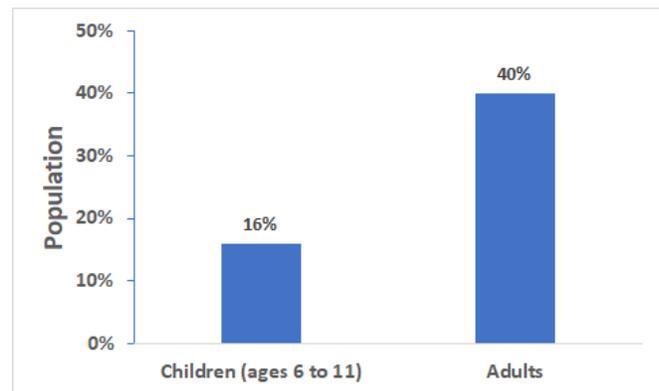


Figure 1. The percentage of the child and adult United States populations that have difficulty swallowing pills. [2][4]

Riding a bike or tying a shoe are seemingly trivial tasks learned at a young age. These tasks are deemed important enough by society and as a result are taught to young children. The tasks become routine and the skills become ingrained. The process of pill swallowing has no set standard or method and, therefore, it is not taught proactively or systematically. As a result, a child's primary experience with swallowing pills is often under times of distress when they are ill and the medication is needed. Consequently, my hypothesis is that children are rarely taught explicitly how to swallow pills and as a result, may be at increased risk for developing pill swallowing issues as adults.

1.1 The importance of learning how to swallow pills

Pills are comparatively more effective, safer, convenient, and less expensive than alternative forms of medication. A cost analysis determined that liquid medication costs five [4] to one hundred times more than tablet alternatives. When taking pills, people are much more likely to adhere to their medication plans [5]. Pills are single dose medications readily available to be consumed; whereas, liquid requires measurement in order to deliver the desired dose. Therefore, it is easier to obtain a more accurate dosage with pills given that measurement is unnecessary [6]. Liquid medication must be stored in a temperature appropriate environment in order to remain viable [7]. It also expires more quickly in comparison to pills. The most significant reason that pill swallowing is critical is that many medications are only offered in pill form. Many medications are released gradually into a person's body throughout the course of the day (time-released medication) [8]. Some examples of time-released pills are ADHD, diabetes, and heart disease medications [9][10][11]. Therefore, increasing the number of individuals who can effectively swallow pills will likely result in improved life-long health across the population.

1.2 The risks of tampering with medication

The inability to swallow pills can be detrimental to a person's overall health. Those who are unable to swallow pills may alter their form of medication intake in a variety of ways. Some may choose to forego taking their medication entirely. Alterations range from skipping doses, crushing, cutting or opening capsules, and taking it with food [4]. Time-released pills that are tampered with can be dangerous and can lead to overdose [12].

1.3 The general benefits of pill swallowing intervention methods

When pill swallowing intervention methods are not proactively implemented before problems arise, individuals may develop negative experiences that lead to physiological barriers such as anxiety, dread, or fear [13]. Anxiety can cause tightening or a sensation of a lump in the throat making it feel as though an anatomical barrier is present. [14]. This feeling is referred to as globus pharyngeus or globus sensation [14]. The sensation results from tension in the cricopharyngeal muscle and early closure of this muscle may be experienced. The muscle behaves similar to a sphincter by preventing the backward flow of food into the esophagus [14]. Additionally, reflux can lead to laryngeal swelling in some people and is amplified with stress because more chemicals and acids appear in the stomach [14]. My research will focus on a variety of methods combating this issue.

2. Techniques used for teaching or aiding in swallowing pills

By comparing and contrasting a variety of pill swallowing techniques, I will assess instructional methods, changes in head position, and the use of a pill swallowing cup.

Table 1. Overview of three techniques for teaching children to swallow pills.

Pill Swallowing Technique	State of Development	Constraints
Instructional methods	Inconsistent learning methods. Minimal academic studies and informal/anecdotal evidence.	Not implemented proactively. Done once there is a need for pills.
Head posture	Mainly academic studies. Not widely published.	Assumes some previous capability of pill swallowing and focuses on making it easier.
Pill swallowing cup	Cup is the most advanced pill swallow aid. Only one academic study with some variability/inconsistencies.	Inconvenience of carrying around a cup. Aids rather than teaches.

2.1 Instructional methods help some children learn a skill the way they learn to tie shoes

Step by step instructions are a clear, methodical way of teaching someone how to perform a task. Various alterations are made when using instructional methods from study to study. Some methods include varying the size of the pill [15]. This is done by using candies of graduated sizes so that the person has practice consuming a wide selection of pill sizes [15]. Instructions also note the position where the pill should be placed in one's mouth, as well as the amount and type of liquid used [4]. Instructional methods are best applied when teaching someone to swallow pills at a young age, as most will likely have fewer negative experiences. Using them to teach a child to swallow pills seems as obvious as teaching a child to read or write but the issue is that this explicit teaching is not commonly provided.

2.2 Success in using head positioning

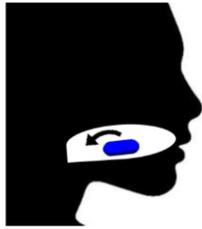


Figure 2.
Swallowing in
centered,
normal position.
[2]

The second method involves the person trying a variety of head positions. Head position has an impact on a person's swallowing abilities [16]. Turning the head from side to side can open the throat, or in other words, result in cricopharyngeal opening [16]. In addition, the pressure decreases in the upper esophageal sphincter (UES) which is the portion of the neck right above the throat [16]. There is a small increase in the throat diameter and a delay in the UES closure [16]. Both anatomical changes can impact someone's success or ability to swallow pills. Overall, head posture may be effective at improving the ease of pill swallowing but this requires more research.

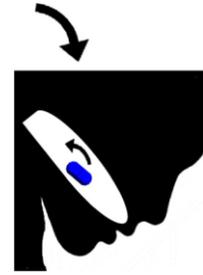


Figure 3.
Swallowing in chin
down position. [2]

2.3 Success in using a pill swallow cup

Various physical aids can be used to enable people to swallow pills. Some include, but are not limited to, a pill cup, swallow gel, throat lubricant spray, and swallow straws. The most featured of these aids is the pill swallow cup due to its design and direct flow to the back of the throat. The cup helps the user swallow pills of a variety of sizes [17]. The lid of the cup has a spout that a person puts their lips around [17]. The angled spout allows for a more forceful flow of water and eliminates the need to excessively tilt one's head back, which closes the throat [17]. There is also a compartment within the lid where the pill is placed, as seen in Figure 4. The compartment must be kept dry, except for when the swallowing action is taking place [17]. This allows for the mixture of both the pill and the water at the same time. The design allows for the force of water to minimize contact of the pill with oral structures within the mouth resulting in a lower likelihood that the user will sense the pill.



Figure 4. Side view
of specialized pill

3. Studies show success in teaching people how to swallow pills using a variety of techniques

A variety of studies were examined to assess the methods used in teaching a person how to swallow pills. Two studies were reviewed to assess a child's ability to swallow pills when given a set of instructions. Four studies looked at the effectiveness of using five different head positions on people of all ages when swallowing pills. One study demonstrates the use and success of using a pill swallow cup. Success rate, convenience, ease of implementation, and prolonged success were all used to assess the varying pros and cons of each method. My conclusion is instructional methods were comparably more successful.

3.1 Studies conducted using scripted instructions

A study was published in the journal *Clinical Pediatrics* in which investigators assessed a child's success in swallowing pills. The study included 124 subjects, all of which were healthy individuals, between the ages of 6 to 11 [4]. They began the study by first asking the child whether or not they could swallow a pill. Any child that already knew how to swallow pills was given two attempts to swallow a placebo with a 4-ounce cup of water. Any child who answered that they were unable to swallow pills was given scripted instructions explaining the steps to swallowing a pill: "I will hand you a pill and a cup filled with water. I want you to place the pill on your tongue towards the back of your mouth and drink down the water, tipping your head slightly back, swallowing the pill. We can try it one more time if you need

another chance. It's OK if you can't swallow the pill, and it's OK if you can. Either way we just want you to try" [4]. They were also given two attempts with an ordinary cup. If the person successfully swallowed the pill, the study ended. Of the patients who reported being unable to swallow pills, 70% were able to swallow a pill with instructions and an ordinary cup [4]. Of the total subject population, 84% were able to swallow a pill within their first two attempts.

If the child failed to swallow the pill after two attempts, they were given a special pill cup to aid in the pill swallowing process. If the child was successful with the pill cup, they would reattempt with an ordinary cup. In total, 91% of the subjects were able to swallow the pill with either the ordinary cup or pill swallow cup [4]. A smaller study with 6 children found similar results from a similar instructional script [18]. The instructional method has a high success rate among all studies. It is thought that these instructions can then become habitual once learned, and as a result are easy to implement with minimal inconveniences. The most important component of this method is that it teaches, rather than just facilitates or aids in the pill swallowing process.

3.2 Studies conducted using five head positions

Four consecutive studies were conducted in Canada by *Paediatrics and Child Health* to assess the likelihood of success and pill adherence using a variety of head positions when swallowing pills.

Table 2. Overview of Studies Conducted Using a Variety of Head Positions [16]

Sample	Method	Result
106 people aged 8–40 who know how to swallow pills	Tested 2 placebo pills in 5 head positions	Only 25% found the head centered position easiest to swallow
134 people aged 18–30	Daily tests of 1 placebo pill in 5 head positions	45% found the head centered position easiest to swallow, while 31% preferred their head turned left or right
108 university students aged 18 to 30 who struggle swallowing pills	Taught the head position, had two weeks of practice, then reported their preference	33% preferred their head centered and another 33% preferred their chin tucked down
41 children, many with life threatening diseases dependent on medication	Learned about the size of their throat and the flexibility of its soft tissue. Then given two weeks to practice at home before reporting their preferences	33 out of 41 completed the study and found a head position that was more comfortable for them

This last study was then tailored to 41 children. Many of the subjects had life threatening diseases and were dependent on medication, however some participants were siblings or friends of those already in the study. The children were shown the size of the esophagus in comparison to the pill that they would be swallowing and the flexibility of the soft tissue within the throat. They were also reassured that they would hear a 'ngunk' noise when swallowing with their head turned. They were then taught the five

different head positions. 8 participants had dropped out of the study [16]. The 33 participants who remained in the study for two weeks were able to successfully find a head position that worked and allowed them to swallow pills [16].

The technique of changing head position has varying degrees of success. There is no unique head position that consistently provides more ease with pill swallowing. However, this technique is easy to implement as it only requires slight changes in head position. This could appear awkward when used in a public setting. Further studies of children that had never learned to swallow pills would be beneficial.

3.3 Study conducted on the pill swallow cup

Pill swallow cups are used by those who have difficulty swallowing pills. It facilitates the pill swallowing process, thus reducing the need to modify your medication [2]. The aim of this device is to allow a person to swallow a pill whole. The special pill cup has a mouthpiece, as seen in Figure 4, that holds the pill in place. Liquid forces the pill to the back of the throat so it can more easily be swallowed [2]. It also allows for pill swallowing to be a one-step process, simplifying it for the user.

In one study, a group of 20 children between the ages of 6 to 11 failed at using an ordinary cup to swallow a pill [4]. After two failed attempts, they used a specialized pill swallow cup. The children were told to drink the water allowing the pill to go in their mouth and then be swallowed. They also read the following script, "I will hand you a cup filled with water that has a pill in a well at the top of it. I want you to drink down the water, tip your head slightly back, letting the pill fall into your mouth. Swallow the water and the pill. We can try it one more time if you need another chance. It's OK if you can't swallow the pill, and it's OK if you can. Either way we just want you to try" [4]. After using the pill swallow cup, 45% of the children were then able to successfully swallow the pills using an ordinary cup [4].

This study, however, does not address whether the subjects would have achieved the same level of success using an ordinary cup for the middle two attempts rather than the specialty pill swallow cup. It is not clear if the child's success was a result of the pill swallow cup or just the extra practice attempts. Additionally, the product aids in pill swallowing but fails to teach the child. There is also an added inconvenience of being dependent on the cup in order to swallow pills. As a result, a person would have to carry the cup with them from place to place in the event that they need to swallow a pill.

4. Conclusion

4.1 Research matrix

The following matrix assesses each method by four criteria:

- **Success rate** looks at not only the popularity of the technique and how widely used it may be, but also the probability that it will work for a normal, healthy child.
- **Convenience** is determined upon whether the method requires additional components to be applied or used when performing this method.
- **Ease of implementation** considers how intuitive or easily understood the method is to be used by a child.
- **Prolonged adherence and success beyond the initial studies/trials** is the most important criterion because it measures long-term success.

All categories were given equal weight. Pill swallowing methods were assessed on a scale of high, medium, or low based on how closely they align with the defined criteria. High is given 3 points, medium is given 2

points, and low is given 1 point. All total points were summed and the instructional method was determined to be the best method for teaching children how to swallow pills.

Table 3. Research matrix used to determine which method is the best for teaching a child how to swallow pills. The instructional method was proven to have the highest success rate, convenience, and prolonged success.

Criteria	Instructional	Head Posture	Pill Cup
Success Rate	High	Medium	Medium
Convenience	High	Medium	Low
Ease of Implementation	Medium	High	Medium
Likelihood of Prolonged Success	High	Medium	Low
Total Points:	11	9	6

4.2 Instructional methods are the most effective way for a child to learn how to swallow pills

Step by step instructions, along with practice, are the best way for children to learn how to swallow pills. This method can be introduced to a child at a young age. Head posture takes two weeks to get used to; whereas, instructional methods can be taught in less than an hour with minimal explanation. Additionally, the pill swallow cup is typically only introduced to children once they have a problem swallowing pills due to its convenience and added cost. It is not ideal to carry a cup with you everywhere you go in the event that you cannot swallow a pill. The research focused on the pill swallowing cup was limited in regards to using it on people with no difficulty swallowing pills. The existing research lacks a direct correlation between learning how to swallow pills at a young age and the ability to swallow pills as an adult.

4.3 Recommendation to conduct further research in this field

Research in this field is limited due to a potential lack of understanding on whether teaching children to swallow pills will have a long-term impact on them as an adult. The importance of teaching children to swallow pills at a young age is not widely known to parents as something that they should proactively be doing. The general behavior is that a child will learn to swallow pills when needed; however, this is the fundamental problem. If a child is left to simply take pills when needed, this can lead to negative experiences and potentially make that child one of the 40% that struggle or cannot swallow pills as an adult.

If children worldwide were taught in a calm, proactive, methodical way, it may reduce their chances of having adverse events. It seems obvious that a child learning how to swallow pills when breaking out in hives, having a headache, or when diagnosed with an illness is less likely to be successful. A child who is taught before an issue or need arises is much more likely to have reduced anxiety and a greater chance at success. Additionally, the reduced cost, increased effectiveness, and greater convenience of pills offers other benefits. More research needs to be conducted on the long-term benefit of teaching children how to swallow pills and the best approach for how the instructions should be scripted and practiced. There needs to be more research examining the correlation between the child and adult populations that struggle to swallow pills as the socio-economic impact on our healthcare systems could

be significant. In doing so, the number of adults who benefit from the impact of improved health that come from swallowing pills may be greatly increased.

References

- [1] A. Ellin, "Can't Swallow a Pill? There's Help for That," *The New York Times*, 21-Sep-2015. [Online]. Available: <https://well.blogs.nytimes.com/2015/09/21/cant-swallow-a-pill-theres-help-for-that/?mtrref=www.google.com&gwh=A2024D03A6480E1535F456ACC8F4E0CD&gwt=pay&assetType=R EGIWALL>. [Accessed: 15-Apr-2020].
- [2] Fda.gov. 2015. *Size, Shape, And Other Physical Attributes Of Generic Tablets And Capsules*. [online] Available at: <<https://www.fda.gov/media/87344/download>> [Accessed 16 June 2020].
- [3] H. Godman, "Two tricks to make it easier to swallow pills," *Harvard Health Blog*, 26-Oct-2018. [Online]. Available: <https://www.health.harvard.edu/blog/two-tricks-make-easier-swallow-pills-201411137515>. [Accessed: 17-Feb-2020].
- [4] E. O. Meltzer, M. J. Welch, and N. K. Ostrom, "Pill Swallowing Ability and Training in Children 6 to 11 Years of Age - E. O. Meltzer, M. J. Welch, N. K. Ostrom, 2006," *SAGE Journals*. [Online]. Available: <https://journals.sagepub.com/doi/abs/10.1177/0009922806292786>. [Accessed: 17-Feb-2020].
- [5] Hori, K., Siu, A. and Yamamoto, L., 2018. Replacing Liquid Antibiotics With Cheaper Pill Equivalents: An Opportunity for Substantial Savings. *Clinical Pediatrics*, 57(11), pp.1294-1299.
- [6] Tse, Y., Vasey, N., Dua, D., Oliver, S., Emmet, V., Pickering, A. and Lim, E., 2019. The KidzMed project: teaching children to swallow tablet medication. *Archives of Disease in Childhood*, pp.archdischild-2019-317512.
- [7] Montreal Children's Hospital. 2020. *Heat And Medication: Humidity And Soaring Temperatures Can Alter Drug Effectiveness*. [online] Available at: <<https://www.thechildren.com/health-info/conditions-and-illnesses/heat-and-medication-humidity-and-soaring-temperatures-can-alter>> [Accessed 9 March 2020].
- [8] Andrade, C., 2020. *Sustained-Release, Extended-Release, And Other Time-Release Formulations In Neuropsychiatry*.
- [9] HealthyChildren.org. 2020. *Common ADHD Medications & Treatments For Children*. [online] Available at: <<https://www.healthychildren.org/English/health-issues/conditions/adhd/Pages/Determining-ADHD-Medication-Treatments.aspx>> [Accessed 19 March 2020].
- [10] S. Jabbour and B. Ziring, "Advantages of extended-release metformin in patients with type 2 diabetes mellitus," *Postgraduate medicine*, Jan-2011. [Online]. Available: <https://www.ncbi.nlm.nih.gov/pubmed/21293080>. [Accessed: 03-Apr-2020].
- [11] "Isosorbide: MedlinePlus Drug Information," *MedlinePlus*. [Online]. Available: <https://medlineplus.gov/druginfo/meds/a682348.html>. [Accessed: 03-Apr-2020].
- [12] CHARATAN, F. 2001. Time release analgesic causes fatal overdoses in United States. *British Medical Journal*, 322, 1143.
- [13] Healthline. (2020). *8 Strategies for Swallowing Pills*. [online] Available at: <https://www.healthline.com/health/how-to-swallow-a-pill#help-a-child> [Accessed 24 Feb. 2020].

[14] Nhsaaa.net. 2016. *Globus Pharyngeus*. [online] Available at: <<https://www.nhsaaa.net/media/1598/20170511globus.pdf>> [Accessed 16 June 2020].

[15] E. P. Ben-Joseph, Ed., "Teaching Your Child How to Swallow Pills (for Parents) - Nemours KidsHealth," KidsHealth, Aug-2019. [Online]. Available: <https://kidshealth.org/en/parents/swallowing-pills.html>. [Accessed: 03-Apr-2020].

[16] Kaplan, B., Steiger, R., Pope, J., Marsh, A., Sharp, M. and Crawford, S., 2020. *Successful Treatment Of Pill-Swallowing Difficulties With Head Posture Practice*.

[17] Oralflo.com. (2020). *40% of American Adults Report Difficulty Swallowing Pills | Oralflo – The Pill Swallowing Cup*. [online] Available at: <http://oralflo.com/40-of-american-adults-report-difficulty-swallowing-pills/> [Accessed 17 Feb. 2020].

[18] Blount, R., Dahlquist, L., Baer, R. and Wuori, D., 2020. *A Brief, Effective Method For Teaching Children To Swallow Pills*.