

PROBLEM STATEMENT: Individuals who need the assistance of underarm crutches for mobility currently do not have an effective, feasible way to transport beverages 5 to 10 feet, possibly from the kitchen counter to the table.

Our team chose this problem because of a conversation I had with a friend who was currently using crutches as a mobility aid, and was frustrated by her inability to do a simple task- carrying a beverage a short distance, without spilling, without the help of another individual. We spoke with experts in the field of physical therapy, who are the individuals that typically issue crutches to patients on a short-term basis. We also talked with crutch users, to see if this problem was wide-spread or an issue with just a select few. We searched academic journals and reviewed patents and existing products to see if there were any product currently available to solve this problem. After all this research we concluded that this is indeed a justifiable problem.

Expert Interviews:

1. *Timothy Petrie DPT* (doctor of physical therapy), personal communication, 6/18/12

- Tim stated that about 15% of his patients are on crutches as a mobility aid
- Tim typically sees about 12 - 15 people per day
- Per Tim's experience, people recovering from surgery typically use crutches anywhere from 10 days to 3 months.

2. *Rebecca Perry DPT*, (doctor of physical therapy), personal communication, 6/19/12

- Crutches are issued much more frequently due to the following: crutches cost much less to issue than walkers and wheel chairs, so insurance is more likely to cover the cost. Children and young adults do not like the stigma of using a walker- they prefer crutches.
- Typically Rebecca works with children who are home with others, so carrying food is not an issue.
- On those occasions where she works with adults, crutches are issued more than other mobility aids. When she issues crutches, she teaches patients how to walk, go up and down stairs, and the safety issues associated with them (tightening wing nuts, watching for water on floor, etc.).
- She has never given instructions on how to carry any type of item while walking with crutches and wouldn't know what to tell them.

Consumer Survey / Interview

Jenny Wiese (262) 376-0105 June 19, 2012 7:30 pm (telecon)

Summary of situation: Jenny is a friend of teammate [redacted name], and had tendon surgery 3 weeks ago. Jenny was issued crutches to use as a mobility aid for 6 weeks. She mentioned to me last week the problems she was experiencing while being on crutches. Jenny's frustration led to our problem statement. Jenny was issued her crutches when she was still hooked up to an IV. She practiced her walking while tethered to the IV pole. She was not able to try to navigate stairs because of the IV. She was given paper instructions for use of crutches, but they did not help her. These instructions applied to weight bearing use, and she could not put any weight on her leg. She was told that every moment she is in a sitting position, her leg must be elevated. Jenny's frustration came when she was unable to transfer her food and cup of coffee to her chair with the elevated rest. She has successfully been able to transfer her coffee cup from kitchen counter to the kitchen "island" and from the island to the

kitchen table, but still can't sit in the prescribed chair.

- Jenny has talked to others that have had crutches, but no one could give her advice on how to transfer her cup of coffee

- Jenny puts her coffee in a small plastic mug with a lid, then places it in a plastic bag, and grabs the bag while holding the crutch handle. Some liquid spills out, but she puts up with that.

- She finds that if she uses the "bag" technique above and there is too much weight, her balance is shifted, causing a potential safety hazard.

- "I just want a way to get my cup of coffee to my chair so I can elevate my leg and relax!"

1. *Timothy Petrie DPT* (doctor of physical therapy), tapetrie@froedterthealth.org, (262) 617-5953, Froedtert Hospital Orthopedic Dept., Milwaukee, WI. Interview on 6/18/12 at 9:00 pm

2. *Rebecca Perry DPT*, (doctor of physical therapy), rebecca.kuemmel@gmail.com, (314) 368-3521, Miami Children's Hospital Outpatient Clinic Miami Lake, FL. Interviewed on 6/19/12 at 6:30 pm

Scholarly Articles

According to a report done by Kaye, Kang, and LaPlante, the number of people using mobility devices has been increasing. Crutch use alone has increased by 14% over the last few years¹. This is much greater than what can be attributed to the aging population (Russell, Hendershot, Leclerc, Howie, and Adler, 1997). An additional factor in this growth can be credited to increasing survival rates of trauma patients. The authors also state that 6.8 million Americans living outside of institutions use mobility assistance devices, and 566,000 of them are using crutches.¹

The increase in crutch use as a mobility device is further substantiated by The Journal of Gerontology: Social Sciences (vol. 56, no. 6, 2001).² In Wisconsin alone, 5% of residents living at home have a physical disability.³ With this increase use of crutches, comes a demand for crutch-related products, that can increase the patient's independence.

¹ Kaye, H. Stephen, Taewoon Kang, and Mitchell P. LaPlante. "UCSF - Disability Statistics Center - Publication - Report 14." UCSF - Disability Statistics Center - Publication - Report 14. N.p., June 2000. Web. 22 June 2012. http://dsc.ucsf.edu/publication.php?pub_id=2 (http://dsc.ucsf.edu/publication.php?pub_id=2).

² Allen, S. M., A. Foster, and K. Berg. "Use of Mobility Equipment Among the Mobility Impaired." Lecture. Annual Meeting of Gerontological Society of America. San Francisco, CA. Nov. 1999. Study Finds Canes, Crutches and Wheelchairs Greatly Reduce Need for Human Help. Robert Wood Johnson Foundation. Web. 20 June 2012. <<http://www.rwjf.org/reports/grr/034188.htm>> (<http://www.rwjf.org/reports/grr/034188.htm>)>.

³ "1999-2001 Biennial Report", Wisconsin Department of Public Instruction Homepage. Wisconsin Family Health Survey, 1998. Web. 19 June 2012. <<http://dpi.wi.gov/pld/pdf/sn06.pdf>> (<http://dpi.wi.gov/pld/pdf/sn06.pdf>)>.

Prior Art

Our team found some existing products and patents that attempt to solve our problem.

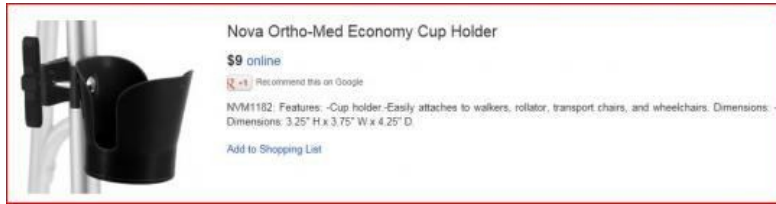
None of the solutions perform the way we want our design to, but the fact that there are some products confirm that the problem exists.

Below are some products we found. More details appear in element B: Documentation and analysis of prior solutions attempts.

a. Existing Products:

Our research indicated that there are no current products on the market that perform the task that we desire. There are some items designed to hold beverages on walkers and canes,

but none for crutches. Below are images of these items:



<http://www.google.com/products>

[/catalog?q=crutch+beverage+holder&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=537042930053462340&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQQ8gIwAw](http://www.google.com/catalog?q=crutch+beverage+holder&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=537042930053462340&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQQ8gIwAw) (<http://www.google.com/products>
[/catalog?q=crutch+beverage+holder&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=537042930053462340&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQQ8gIwAw](http://www.google.com/catalog?q=crutch+beverage+holder&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=537042930053462340&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQQ8gIwAw))



<http://www.google.com/products>

[/catalog?q=cru tch+beve ra ge+ho ld er&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=4600479176258782807&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQ8gIwBA](http://www.google.com/catalog?q=cru tch+beve ra ge+ho ld er&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=4600479176258782807&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQ8gIwBA) (<http://www.google.com/products>
[/catalog?q=crutch+beverage+holder&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=4600479176258782807&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQ8gIwBA](http://www.google.com/catalog?q=crutch+beverage+holder&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-8&tbn=shop&cid=4600479176258782807&sa=X&ei=aZXiT_TUKeq2AWclo3XCw&ved=0CGQ8gIwBA))



<http://www.google.com/products>

[/catalog?q=crutch+cup+holder&hl=en&client=firefox-a&hs=HH8&rls=org.mozilla:en-US:official&prmd=imvns&bav=on.2,or.r_gc.r_pw.r_qf.cf.osb&biw=1366&bih=638&um=1&ie=UTF-8&tbn=shop&cid=15392180584249618892&sa=X&ei=8TXiT_LSBqrY2gX4h_CoCw&ved=0CIIsBEP_MCMA](http://www.google.com/catalog?q=crutch+cup+holder&hl=en&client=firefox-a&hs=HH8&rls=org.mozilla:en-US:official&prmd=imvns&bav=on.2,or.r_gc.r_pw.r_qf.cf.osb&biw=1366&bih=638&um=1&ie=UTF-8&tbn=shop&cid=15392180584249618892&sa=X&ei=8TXiT_LSBqrY2gX4h_CoCw&ved=0CIIsBEP_MCMA) (<http://www.google.com/products>
[/catalog?q=crutch+cup+holder&hl=en&client=firefox-a&hs=HH8&rls=org.mozilla:en-US:official&prmd=imvns&bav=on.2,or.r_gc.r_pw.r_qf.cf.osb&biw=1366&bih=638&um=1&ie=UTF-8&tbn=shop&cid=15392180584249618892&sa=X&ei=8TXiT_LSBqrY2gX4h_CoCw&ved=0CIIsBEP_MCMA](http://www.google.com/catalog?q=crutch+cup+holder&hl=en&client=firefox-a&hs=HH8&rls=org.mozilla:en-US:official&prmd=imvns&bav=on.2,or.r_gc.r_pw.r_qf.cf.osb&biw=1366&bih=638&um=1&ie=UTF-8&tbn=shop&cid=15392180584249618892&sa=X&ei=8TXiT_LSBqrY2gX4h_CoCw&ved=0CIIsBEP_MCMA))

b. Patents:

There are 8 patents for crutch accessories, but none enable a beverage to be transported without moderate spilling:

#3026887 issued 3/27/62

#4428390 issued 1/31/84

#5647519 issued 7/15/97

#5803327 issued 9/8/98

#8146614B2 issued 4/3/12

More information on these patents can be found in section B

