

MEDICINE CASE STUDY HIGHLIGHT THE PROBLEMS OF FINNISH HOUSEHOLDS IN MEDICINE CONSUMPTION PRACTICES

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Abstract

Medicine education as part of health education aims to educate about rational medicine use: the right medicine taken in the right way at the right time for the right problem. Storage places of medicines are one issue discussed in medicine education. This participative observation research of Finnish households' (n = 10) medicine storage places was conducted together with interviews of 12 mothers and 12 children concerning medicine consumption habits. Data were analysed using directed content analysis. In all interviewed households (n = 12), children and mothers confirmed the same storage places for the medicines. None of the households locked the medicine storage places even if the cabinets had a lock and key. The number of medicine types varied widely among the studied households (n=10), from 8 to 33. The number of expired medicines ranged from 1 to 10 pieces per household. At home medicines are discussed consciously when the child, family member, relative or a friend has a long-term illness, when being sick and while taking medication. Mothers identified themselves as being responsible for the medicine cabinet at home. Mothers were categorised into four groups – home nurses (2), forgetful (2), reckless (2) and health conscious (4) – based on their medicine consumption and storage practices. Some of these practices do not demonstrate the appropriate use and storage of medicines. Based on the findings, we recommend that educational material should be developed on medicine storage and use.

Key words: *medicine education, medicine storage, medicine consumption, medicine safety.*

Introduction

Proper and safe consumption of medicines produces health and well-being for families. Taking care of own and family members' health is a part of everyday life management in households. Medicine education can be seen as part of the home health education and as a co-operation between children, parents, teachers, and health care professionals, the purpose of which is teach children the right and appropriate use of medicines (Hämeen-Anttila, 2006). The use of medicines, both prescription and non-prescription, among all age and sex groups has become more common in several countries including Finland (Dengler & Roberts, 1996; Chambers, Reid, McGrath & Finley, 1997; Stoelben, Krappweis, Rossler & Kirch, 2000; Hansen, Holstein & Due, 2003; Finnish Medicines Agency, 2014). The increased consumption of medicines can be seen partly as a result of early diagnostics of different diseases as well as increased consumption of non-prescription medicines (Tuomainen, Myllykangas, Elo & Rynänen, 1999; Lahelma, 2003, p. 1865). In particular, small problems are often treated with non-prescription medicines (Lilja, Salek, Alvarez & Hamilton, 2008). People take care of about 90% of their symptoms using non-prescription medicines (Ahonen, 2008). Among

the Finnish population, 13% use non-prescription medicines daily (Finnish Medicines Agency, 2014). In Finnish pharmacies and retailers, the top-selling non-prescription medicines are painkillers (20%), nicotine replacement therapy medicines (19%) and digestion medicines (18%) (Pharmarket, 2015). Many households store a wide range of medicines; the challenge is for them to use and store these medicines properly.

Proper storage of medicines in households is an important issue, especially for families with children. The proper way to store medicines is to keep them locked in the medicine cabinet, for safety reasons and because the medicines should not be exposed to moisture (Association of Finnish Pharmacies, 2010). A few recent researches have reported medicine misuse in adolescents due to unlocked medicine cabinets (Vaughn & Donohoe, 2013; Binswanger & Glanz, 2015; Ozieta, 2015). Accidental poisonings from the consumption of expired and unused prescription medicines have also been reported (Vaughn & Donohoe, 2013).

Information is scarce on how and how often parents discuss medicines with their children. Halmesmäki, Hjelt and Välimaa (2004) have shown that health issues are typically discussed only incidentally, however, when necessary parents give more time on health issue. Our earlier study (Hokkanen, 2015) and a study conducted in Lithuania (Daukšienė & Radžiūnas, 2009) showed that mothers are mainly responsible for the medicine cabinet at home. Previous studies on households' medicine cabinets examined the following: (1) the proper storage of medicines in households (Lima, Nunes & de Barros, 2010; Mastroianni, Lucchetta, Sarra Jdos & Galduróz, 2011; Foroutan & Foroutan, 2014; Lee See, Arce & Deliman, 2014), (2) the contents of medicine cabinets (Ahonen, Kalpio, Vaskilampi & Hallia, 1996, pp. 278–279; Sanz, Bush & Garcia, 1996, pp. 77–101; De Bolle, Mehuys, Adriaens, Remon, Van Bortel & Christiaens, 2008) and (3) medicine cabinet maintenance and cleaning practices (Association of Finnish Pharmacies, 2010).

A research conducted in eight countries (the Netherlands, Greece, Germany, Finland, Spain, Italy, Yugoslavia and the United States) found that medicines were generally stored in the kitchen, refrigerator and bathroom. More than half of the households kept their medicines in one place. In Finland, one in three households kept their medicines in the kitchen. Medicines were kept in cabinets together with food or hygiene products; cabinets were rarely locked and were accessible to children. (Sanz *et al.*, 1996, pp. 77–101.)

In Finland, only about one in three households kept medicines in medicine cabinets, and only 22% of those households kept the cabinets locked. The Finns also proved to be lazy cleaners of medicine cabinets: 35% of Finns checked or cleaned their medicine cabinets more than once a year, while 39% did so once a year. In one out of five (19%) households, the cleaning interval stretches to at least two years. (Association of Finnish Pharmacies, 2010.)

The most recent researches on household medicine storage were conducted in the Philippines and Iraq. The main storage places for medicines in Philippine households were cabinets at room temperature away from direct sunlight (42%), followed by pill containers (23%), the living room (19%), the refrigerator (12%) and the bedroom (4%) (Lee See *et al.*, 2014). In Iraq, the most common storage place for medicines was the refrigerator (51%) (Foroutan & Foroutan, 2014). Two Brazilian researches found that the most common medicine storage locations were easily accessible to children or pets and susceptible to light and moisture (Lima *et al.*, 2010; Mastroianni *et al.*, 2011). Similarly, a Belgian research on the medicine consumption of 18–80-year-olds showed that medicine packages were not safely stored (33%). Furthermore, 9% of the medicines were not stored in their original containers, and 18% had missing package inserts. (De Bolle *et al.*, 2008.)

Household cabinets usually contain a wide variety of medicines, ranging from about 6–136 pieces (Ahonen *et al.*, 1996, pp. 278–279; Sanz *et al.*, 1996, pp. 77–101; De Bolle *et al.*, 2008). Non-prescription medicines such as painkillers are common (Foroutan & Foroutan, 2014; Lee See *et al.*, 2014).

Problem of Research

Medicine use has typically been studied from the perspectives of pharmacy and medicine research. However, due to the wide range of medicines and their observed improper storage in households, there is a need to study the use of medicines from the educational perspective. Previous research has shown that medicine consumption practices and attitudes towards medicines are transmitted in the family from parents to children (Andersen, Holstein, Due & Hansen, 2009; Sepponen, 2011; Lindell-Osuagwu, 2014). In this sense, issues concerning the use of medicines in households can be seen as part of the health education given by parents. The aim of medicine education at home is to manage the use of medicines in everyday life.

Research Focus

The purpose of the research is to explore 1) the typical storage places of medicines in households, (2) the contents of the medicine cabinet, (3) the person responsible for the maintenance and cleaning of the medicine cabinet and (4) medicine discussions between mother and child.

Methodology of Research

General Background of Research

This research is part of a larger case study where a medicine education intervention was conducted in one Finnish comprehensive school for the 4th and 7th graders. The research was conducted as a case study for the students and their parents of a primary school in Eastern Finland between 2011 and 2013. Mixed method research was used where in the first stage the students' parents answered a questionnaire (n=250). The second stage of the research included medicine education intervention for the 4th and 7th graders after which the children and their parents were interviewed at their home. Mothers (n=12) and children (n=12) participated in the half structured interviews concerning home medicine education. At the end of the interview, the mother was asked if the family's medicine storage places could be explored.

Sample of Research

This paper focuses participant observation data (n=10), which is supplemented by interviews (n=12). From the 4th graders' (N=51 families) five families agreed to an interview, and that of 7th graders (N=47 families) seven (Table 1). The sample size is small, however, the data obtained is rich and versatile. Despite the fact that we cannot generalize qualitative data to concern all parents and pupils in a case study this data will support the evidence obtained from the questionnaire.

Informed consent was obtained from the participants, and permission to conduct the study was applied by the Ethical Committee of the University of Eastern Finland. Participation in research was voluntary, and a separate consent form for parents to sign was given. The participants were told that research results will be reported in a manner that the identity of participants will not be revealed. The names of the participating mothers are pseudonyms.

Table 1. Interviewed families (n=12).

Representatives of families	
Eve (45 years old), a group assistant.	Son, 4th grader
Maria (38 years old), health care vocational school diploma.	Son, 4th grader.
Sarah (46 years old), education sector.	Son, 4th grader.
*Mabeline (50 years old), secretary.	Son, 4th grader.
Peggy (44 years old), higher medical training.	Son, 4th grader.
Maggie (53 years old), chief.	Son, 7th grader.
Sheila (51 years old), education sector.	Son, 7th grader.
*Moirra (44 years old), education sector.	Son, 7th grader.
Iris (53 years old), education sector.	Daughter, 7th grader.
Thea (43 years old), education sector.	Son, 7th grader.
Tamara (53 years old), secretary.	Daughter, 7th grader.
Jane (38 years old), health care vocational school diploma.	Son, 7th grader.

* marked with an asterisk in the table were not involved in medicine cabinet research.

Instrument and Procedures

The interviews took place predominantly in the participants' homes, except for one interview, which was conducted in the workplace. Semi-structured interviews were conducted using a protocol containing 40 questions about medicine consumption and education at home. Medicine cabinet research in households was pretested on one family and was found to be effective. During the observation, the researcher asked about the medicines and checked the storage places together with a household member. The researcher allowed the households to show their medicine cabinets in any way they deemed appropriate. The researcher filled in a form while the participants showed their medicines and explained the ailments for which the medicines were used.

The participating households did not know about the medicine cabinet observation in advance, so the situation at home was as natural as possible. Participant observation was thought to give valid information on medicine storage practices in households. An earlier study on medicine storage practices in Finland used questionnaires and failed to find out the contents of the participants' medicine cabinets. The participants of that study may not fill the form honestly (Ahonen *et al.*, 1996). In the present study, medicine cabinet observation was conducted in all the households in a relaxed atmosphere.

Data Analysis

Data from the interviews were transcribed and uploaded to a text editor together with the written observation data. Data were examined using directed content analysis, where categories stemmed from research questions that were formulated based on earlier studies (Hsieh & Shannon, 2005).

Results of Research

Consumption of Medicines

The average number of medicines consumed was 19.5. All the household members mentioned using or having used 1 to 18 different kinds of medicines. The youngest medicine user was a 10-month-old baby girl, and the oldest was a 70-year-old man. 70-year-old used more medicines than the younger household members.

Medicines Stored in Households

The number of medicine types stored in the households ranged from 8 to 33 (Table 2). Of all the medicines, 70% were non-prescription. Of the non-prescription medicines, 17% were painkillers and 22% were vitamin supplements.

Table 2. Households' characteristics and medicine storage.

Members of the household	Medicine storage places	N	Non-prescription medicines	Prescription medicines	Expired medicines
Maria, her husband and their four children (ages 10 months and 12, 9 and 8 years)	On the upper shelves of the kitchen cabinets, unlocked.	19	14 (headache, fever, food supplement, sore throat, hives)	5 (asthma, rheumatic, vocal cord inflammation)	-
Eve, her husband and their two children (ages 10 and 7)	Daily medicines were on the upper shelves of the kitchen cabinets, unlocked. Rarely used medicines were kept in the medicine cabinet in the vestibule, unlocked.	20	9 (sore throat, cough, food supplement)	11 (asthma, rheumatic, migraine)	-
Sarah, her husband and their two children (ages 10 and 8)	Daily medicines were on the upper shelves of the kitchen cabinets in small sachets, unlocked. Strong medicines were on the top shelf of the wardrobe, unlocked.	31	24 (headache, insomnia, food supplement, athlete's foot, cough, growing pains, dry ears, flu)	7 (inflammation, pain, sleep disorder, ear itches, surgical incision)	10
Peggy, her husband and their two children (ages 11 and 7)	Daily medicines were on the upper shelves of the kitchen cabinets in small baskets, unlocked. Some medicines were on the upper shelves of the bathroom cabinets, unlocked. The mother's sleeping pills were in the bedside table drawer, and the father brought his medicines on a business trip.	8	2 (irritable bowel syndrome, pain)	6 (allergy, bedwetting, eczema, sleep disorder)	1
Maggie, her husband and their three children (ages 13, 12 and 9)	On the upper shelves of the kitchen cabinets in small sachets, unlocked. Father's strong medicines were in the bedside table drawer, unlocked.	13	8 (headache, fever, food supplement, insomnia)	5 (migraine, cough, pain)	-

Members of the household	Medicine storage places	N	Non-prescription medicines	Prescription medicines	Expired medicines
Sheila and her child (age 14)	On the upper shelves of the kitchen cabinets, unlocked. Some of the medicines were in the bathroom, without packaging. Mother's medicines were in the bedroom, unlocked.	27	21 (food supplement, pain, painful joints)	6 (migraine, sleep disorder, pain)	3
Thea, her husband and their three children (ages 13, 14 and 9)	In the kitchen spice cabinet, on the kitchen worktop and in the refrigerator, unlocked.	10	6 (diarrhoea, pain, allergy)	4 (allergy, diabetes)	-
Iris, her husband and their child (age 13)	In the pigeonhole in the front room and in the refrigerator, unlocked.	15	10 (food supplement, allergy, pain, medicine samples received by the father, who is a doctor)	5 (allergy, medicine samples received by the father, who is a doctor)	-
Tamara, her husband and their three children (ages 18, 16 and 14)	On the upper shelves of the kitchen cabinets and in the refrigerator, unlocked. Father's strong medicines were in the bedside table, unlocked.	18	10 (food supplement, allergy, pain, diarrhoea)	8 (back pain, diabetes, warts, inflammation, hypothyroidism)	1
Jane, her husband and their three children (ages 14, 11 and 8)	On the upper shelves of the kitchen cabinets, unlocked.	38	35 (flu, food supplement, pain, smoking cessation)	3 (allergy, contraceptive, back pain)	1
Total		199	139 (70%)	60 (30%)	16 (8%)

Maria describes her stored medicines as follows:

"Yeah, I do not have anything else here except some painkillers, suppositories and liquid Panadol, and maybe one of my husband's medicines. My husband has rheumatic; he keeps his own medicines in a bag up there, so that no one can reach it."

Jane said that they do not use a lot of medicines, but they have the richest non-prescription medicine warehouse (35 pc):

"We don't use very much medicines."

Two mothers were thinking that they must clean their cabinets:

"In fact, today I just looked at that [the medicine cabinet]. Oh my God, some kind of inventory should be done." (Eve)

"Should I put a sign on the cabinet saying that if you clean it, you should remove the old medicines? At the moment, there aren't that many old medicines." (Iris)

The number of expired medicines ranged from 1 to 10 pieces per household. Sarah's household had the highest number of expired medicines. Sarah's medicine cabinet had not been cleaned in a long time; she put the expired medicines aside to bring to the pharmacist.

Storage of Medicines

In all interviewed households (n = 12), children and mothers confirmed the same storage places for the medicines. Some observed mothers (n=10) describe their storage of medicines as follows:

“There they are [referring to a kitchen cabinet], unlocked.” (Jane)

“We have medicines in small sachets. However, the store still needs improvement.” (Sarah)

“The kitchen cupboard has our vitamins so that we will remember to take them. Some of the creams and other medicines are right there in the bathroom. Then I have an anti-migraine drug and Burana in that bedside drawer”? (Sheila)

“[The medicines] are not in locked places, but they are on the top shelves ... Our children are not interested in exploring cupboards.” (Maggie)

“[The medicines are] not in locked places. The daily medications are in the kitchen cupboard.” (Thea)

“It is not locked. Some medicines are on the upper shelves of the kitchen cabinets, and some are in the bathroom cabinets.” (Peggy)

“They [the medicines] are in that green cupboard and are not locked.” (Tamara)

None of the households locked the medicine storage places even if the cabinets had a lock and key. The medicines that were constantly used were often stored on the upper shelves of the kitchen cabinets even if the household had a medicine cabinet. Several participants kept some of their medicines in the bathroom cabinet. Three families kept medicines that required cold storage in the refrigerator. Another three families kept their personal medicines in their bedside table drawers or in their backpacks/bags in school or in the workplace. The mothers cited the following reasons for keeping medicines unlocked on shelves: their children were already old enough, and they did not show any interest in opening the medicine cabinet on their own. The mothers also mentioned that it is easy to forget to take pills if they are not within reach, such as in the kitchen cupboard. One mother mentioned locking her medicine cabinet only, when they got guests with small children to prevent children from exploring it.

Mothers identified themselves as responsible for the medicine cabinet at home. Mothers were categorised into four groups based on their medicine education habits and storage practices (Table 3).

Table 3. Four types of mothers based on medicine storage practices.

Type	Mother	Medicine storage practices
Home nurse	Maria	Treats diseases with non-prescription medicines found at home. Slightly careless custodian of medicines but cleans the medicine cabinet periodically. Her family has two migraine medicines and two asthma medicines, but these were not presented.
	Jane	Owns a rich non-prescription medicine store. Slightly careless custodian of medicines and does not clean the medicine cabinet often (one of the medicines was four years old).
Forgetful	Eve	Does not remember the contents of the medicine cabinet.
	Iris	Does not remember the contents of the medicine cabinet, which is full of medicine samples.
Reckless	Sarah	Has a rich pharmaceutical store. Treats diseases with non-prescription medicines found at home. Has not cleaned the medicine cabinet in seven years.
	Sheila	Has a rich pharmaceutical warehouse. A few medicines have missing packaging. Some medicines are expired.
Health conscious	Maggie	Regularly cleans medicine storage places and is aware of the contents of the medicine cabinet. Relies on prescription medicines.
	Thea	Regularly cleans medicine storage places and is aware of the contents of the medicine cabinet.
	Peggy	Regularly cleans medicine storage places and is aware of the contents of the medicine cabinet and whether there are expired medicines.
	Tamara	Regularly cleans medicine storage places and is aware of the contents of the medicine cabinet and whether there are expired medicines.

Home nurses (2) have a wide variety of non-prescription medicines with they take care of illnesses at home, but they differ from each other with regard to cleaning practices. *Forgetful mothers* (2) do not remember what they have in their medicine cabinets because they do not clean these cabinets often. *Reckless mothers* (2) have a lot of medicines but do not take care of their medicine cabinets. So there are old medicines and some medicines have missing packaging. *Health-conscious mothers* (4) take care of their medicine cabinets and are well aware of the contents of these cabinets.

Medicine Discussions

At home medicines were discussed consciously when the child, family member, relative or a friend has a long-term illness, when being sick and while taking medication, based on the mothers and children's interviews. Peggy described her discourse with her children as follows:

"We talk when is flu situation, normal virus disease, that when the use of the medicine it is appropriate and why the medicine will be taken when I give it and allergy is, of course. How medicine affects and living be easier...maybe it's that those medicines can also be dangerous, that there is also that mark, that children do not ever take them for yourself, that normally I'm the one who take care of and give the medicines."

Many children said that they need permission to parents before taking medicine:

“Before taking painkillers I always ask my mother or father or from an adult permission.” (Sarah’s 10 years old boy)

Mothers and children discussions concerned prevention of illnesses, necessity of vaccinations, home treatment for healing purposes, self-care and prescription medicines, circumstances in which medicines can be used, and the dosage, influence of medicines and drug abuse. In addition, parents and other people in the close circle passed on models of medicine use even unconsciously by using medication themselves.

Discussion

The consideration of the use of medicines is an integral part of health education given by homes. In this study, all members of the households used or had used medicines. This finding is consistent with those of earlier studies, which showed that medicine use has become more common among all age and sex groups in several countries including Finland (Dengler & Roberts, 1996; Chambers *et al.*, 1997; Stoelben *et al.*, 2000; Hansen *et al.*, 2003; Finnish Medicines Agency, 2014). The average number of medicines consumed was 19.5, which is higher than that found in earlier studies (e.g. Sanz *et al.*, 1996; De Bolle *et al.*, 2008). Of all the medicines, 70% were non-prescription, which supports earlier observations that small problems are usually handled by non-prescription medicines (Ahonen, 2008; Lilja *et al.*, 2008). Of the non-prescription medicines, 17% were painkillers which were the top-selling medicines in pharmacies in Finland in 2014 (Pharmarket, 2015).

We also observed the households’ medicine consumption and storage habits, which may pose health risks for their members. These habits included (1) inappropriate storage places for medicines and unlocked cabinets, (2) sharing prescription medicines with children and (3) expired medicines kept in the cabinets.

Families had their own methods to treat diseases, for example cognac. Laymen’s methods for the treatment of health and illness are classified under public sector medical care (Kleinman, 1980; Prout & Christensen, 1996, p. 33). In the present study, 70-year-old used more medicines than the younger household members, as expected; many studies have shown that the use of medicines increases with age (Klaukka, Martikainen & Kalimo, 1990; Helakorpi, Holstila, Virtanen & Uutela, 2012; Martikainen, Alha, & Rajaniemi, 2012).

All household members confirmed the same storage places for the medicines, similar to the findings of Hämeen-Anttila (2006). Many households kept the daily medicines in the kitchen, which supports the findings of Ahonen (1996). None of the households locked the storage places of the medicines, which is consistent with the results of several other studies (Sanz *et al.*, 1996, pp. 77–101; De Bolle *et al.*, 2008; Association of Finnish Pharmacies, 2010; Lima *et al.*, 2010; Mastroianni *et al.*, 2011). The parallel study of fourth graders by Kärkkäinen, Hämeen-Anttila, Vainio and Keinonen (2014) found that students drew medicine cabinets mainly without a lock and key; only a few of the students said that medicines should be kept out of the reach of children.

Households in this study were lazy medicine cabinet cleaners (see also Association of Finnish Pharmacies, 2010). Many households had expired medicines. Mothers identified themselves as being responsible for the medicine cabinet at home, which was also the case in a Lithuanian study (Daukšienė & Radžiūnas, 2009). Some mothers cleaned their medicine cabinet regularly, while others cleaned it every two years (see also Association of Finnish Pharmacies, 2010).

Parents may intentionally share their prescription medicines with their children to treat minor pain and injuries (Binswanger & Glanz, 2015), which was also observed in this study. Parents are an important source of opioids for the youth, especially if the medicine cabinet is not locked (Binswanger & Glanz, 2015). In the present study, mothers trusted their children and did not lock the cabinets. However, medicine cabinets in the home are among the youth's major sources of substances for drug use (Vaughn & Donohoe, 2013; Ozieta, 2015). Another danger related to medicine cabinet use is the mismanagement of expired and unused prescription medicines, which can cause accidental poisonings (Vaughn & Donohoe, 2013). The present study found some households with expired medicines, some of which were still in use.

Health issues and medicines are often discussed incidentally in families (Halmesmäki, *et al.*, 2004). This was also seen in this study. Mothers discussed on medicines with their children when someone got ill or while it was time to take medicine.

Limitations of the Research

This research has some limitations. According to Stake (2000, pp. 236–237), a case study desires to understand the case rather than to generalise it. Based on this research, it was not possible to make generalisations on the Finnish households' medicine consumption and storage practices. Furthermore, the mothers who participated in the research were well educated, and some of them worked in the health care sector. Thus, they had more knowledge of proper medicine storage and use. In addition, while conducting the observation, a few mothers (3) refused to show all their possible medicine storage places. The reasons for this remain unknown. Nevertheless, most of the mothers spoke openly, such as about contraceptive preparations or medicinal products for the cessation of smoking. Overall, our research was able to identify the typical characteristics of four different types of mothers with regard to medicine consumption and storage habits.

Conclusions

This medicine cabinet research revealed that households keep medicines in inappropriate places. Medicine cabinets were unlocked, and medicines were kept together with foodstuffs. Some households also consumed expired medicines. In many families, prescription medicines provided to one member of the family could be used by the rest of the family. Medicines were discussed consciously when someone in the close circle is sick. Mothers serve as a model for their children on how to use and keep medicines, but not all mothers demonstrate recommended practices. Home nurses are somewhat careless custodians of medicines, forgetful mothers do not remember what their medicine cabinets contain and reckless mothers have a rich pharmaceutical warehouse but rarely clean their medicine cabinets. Health-conscious mothers set a better example for their children, but they also keep medicines in unlocked cabinets. Based on the findings, we recommend that educational material should be developed on medicine storage and use. It should focus how to store different medicines and why.

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