

Digital Opportunities to Facilitate Workflows of Community Pharmacies and its Advantages to Increasing General Pharmaceutical Service Time – A Time Tracking Study for Practicability

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Research Article

Received date: 20/07/2019

Accepted date: 31/07/2020

Published date: 07/08/2020

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Keywords: Pharmaceutical care, Digitalization, European pharmacies, Pharmacy administration, Automated dispensing`

INTRODUCTION

Digitalization became a worldwide game changer of our daily routine. More and more advanced computer technologies are able to perform standardized tasks in almost all fields of different industries. New innovative digital solutions offer further potential for the optimization of workflows in community pharmacies as well.

Complex pharmaceutical supply chains and workflows with several different shareholders involved currently undergo a rapid transformation as a result of new digital solutions. These solutions might be disruptive to the so far established work-chains as they are easily applicable and cost-effective. Traditional pharmacy might be outrun by these trends. New solutions cover a whole range of R&D procedures, within the fields of GMP, GDP as well as GPP.

Therefore, pharmacists try to implement solutions to digitalize their workflows. By doing so, such trends can be adapted and integrated into the already existing standard procedures. This happens worldwide.^[1-5]

Pharmacists, beside dispensing, provide advice on therapy management, medical information to patients who are more educated and engaged to their health than before; pharmacists at the same time help laity to solve difficult prescription situations.

In a business that is currently in a huge change regarding its tasks to the public, digitalization could be either disruptive or highly beneficial to the current situation and a lifeline for the future. Pharmacies find themselves in the middle of this struggle.

Therefore, an evaluation of the current situation with and without the digital solutions, such as automated medication dispensing robot systems and others, is done to see if it could improve the quality of service provision in the pharmacy. This is of high importance.

Our study aims to evaluate these pharmaceutical services and provide an overview by a time tracking study, and wishes to point out advantages of digitalization that could enable more time to perform pharmaceutical care.

When it comes to pharmacy operations, efficiency is everything. In everyday operations the resources such as time and personnel are limited, so one should know the required time of the various different tasks to optimize service provision with high quality.

When focusing on dispensing a single box of medicine, it requires several different activities in the background, starting stock control and ordering, throughout of appropriate storing, as well as the actual activity of dispensing to the patient.

In general, one can divide between pharmaceutical and non-pharmaceutical duties.

In Germany, set by law, pharmaceutical activities can only be handled by either pharmacists themselves or pharmaceutical-technicians. Pharmaceutical tasks include patient education, the consultation on therapy management, individual drug manufacturing / pharmaceutical formulations and the dispensing of drugs.

As well as, the analytical testing of raw materials in the laboratory, the plausibility evaluation of individual formulations and their documentation are to be performed by pharmaceutical personnel only.

If we concentrate on the duties of pharmacist, one can divide between work that takes place in the back-office for documentation or laboratories for testing and the direct contact with the patient in the front of the pharmacy. From the perspective of pharmaceutical care, the direct contact and communication to patients is the most important task, that requires adequate time to be performed within highly professional quality standards.

METHODS

The overall strategy of this study was to assess the hypotheses that digitalization saves time for pharmaceutical care activities in daily practice.

The measurements took place in four public pharmacies in Germany. Pharmacy *Code 1* and *Code 2* serve smaller cities in a rural area with 250-450 customers per day and are equipped with a fully automated stock control system.

Pharmacy *Code 3* serves a city in rural area while Pharmacy *Code 4* serves a smaller village in the countryside. Both, Pharmacy *Code 3* and *4* do not have an automated stock control system, as they use manual cabinets. Nevertheless, the non-automated pharmacies handle customers ranging 250-400 a day.

Pharmacies types *1-4* were chosen because their customer numbers per day, stated above, they reflect the customer numbers of an average pharmacy in Germany.^[6]

As the EU has a certain ratio considering number of pharmacies per inhabitants, in fact 31 per 100.000 inhabitants,

The general usability of this study could be applied for the whole European Union.

Germany's pharmacy-per-inhabitant-ratio is close to the EU's ratio with 25 pharmacies per 100.000 Inhabitants^[7].

The time tracking study compares in our survey two different settings the required times of the certain tasks of the pharmaceutical personnel.

This would help to get an overview of the average time pharmacy staff wishes to have for interacting with patients while dispensing the medicine.

Patient education, pharmacovigilance activities, monitoring for adverse effects, interactions of drug use as well as the personal communication aims to improve patient adherence are activities and services that are recognized by definition to be part of pharmaceutical care. Our Survey was conducted in German language and to estimate, in their opinion, the minimum time required for maximum pharmaceutical care.

Questions regarding aspects, that obstruct the main focus on pharmaceutical care, are applied as well. The consistent significance of these chosen aspects gets considered though. Therefore, a time tracking study is focusing on the following activities, tasks:

1. Delivery time of the of the correct drug out of an automated stock versus manual cabinet in our four pharmacies, two with automated stocks and two with manual cabinets are focused. Time was measured and was correlated with the number of boxes that are ordered from the stock.

The median time per box ordered was recorded.

2. Compare availability of a specific drug through different procurement methods. MSV3 (Medium Speed Version 3) communication interface is a technical standard from pharmacies to call up procurement availabilities at the pharmaceutical wholesalers. MSV3 is designed to enable quick information to pharmaceutical staff about procurement availabilities from the pharmaceutical wholesalers' stock. The German MSV3 (Medium Speed Version 3) will be compared to phone-based order requests to pharmaceutical wholesalers. The aspect of unclear digital procurement availability results, still making phone calls necessary to check exact delivery times, is under special observation.
3. Compare time needed for activities regulated by EU 2011/62/EU („Secure Pharm”), to fight drug counterfeiting^[8]. Measuring time between the solution of a manual access to the specific drug batch database (AMIS)^[9] versus the automated access via a digital interface, that connects the goods receipt data with the goods management system at the point of sale. This digital interface can be defined by the WWKS2-standard in Germany WWKS2 connects the badge information of a package that is stored in the automatic stock with the point of sale. This enables an omitting of a manual badge check in order with the packages submit.^[10-12]

RESULTS

If comparing a digitalized operating system with digitalized one we can see that our data shows, that pharmacists in general would like to have 32.5% more time to consolidate with a customer for tasks that they need to provide for their patient required by law as it is summarised on Table 1. This would not increase the available time for pharmaceutical care services directly. If comparing a on digitalized operating system with digitalized one we can see that our data shows, that pharmacists in general

would like to have 32.5% more time to consolidate with a customer for tasks that they need to provide for their patient required by law as it is summarised on Table 2. This would not increase the available time for pharmaceutical care services directly.

Table 1: Desired time for optimum pharmaceutical care.

Participant #	Pharmacists <i>Time in minutes</i>	Pharmaceutical technical assistants
1	8	6
2	5	5
3	7	4
4	6	6
5	9	7
6	12	5
7	11	6
8	7	6
9	9	4
10	8	5
11	6	7
12	-	4
13	-	7
14	-	8
15	-	5
16	-	6
17	-	4
18	-	6
19	-	3
20	-	5
21	-	6
22	-	5
23	-	5
24	-	6
25	-	5
26	-	4
Average	8.0	5.4

Table 2: Aspects that obstruct the main focus on pharmaceutical care.

Pharmacist	Documentation (A)	Secure Pharm B)	Drug availability C)	Which one indispensable?
1	X	X	X	A C
2		X	X	C
3	X	X	X	A B C
4	X		X	C
5		X		-
6	X	X	X	A C
7	X	X	X	A B C
8	X	X		B
9			X	C
10		X		-
11	X	X		A
Total in %	63,6%	81,8%	63,6%	A: 45,5% / B: 27.2% / C: 63.6%
Pharm. Tech.				
1	X	X	X	C
2		X	X	C
3			X	C
4	X	X	X	AC
5	X	X		-
6		X	X	B
7				-
8	X	X	X	AC
9	X		X	C
10		X	X	C
11	X		X	A

12	X		X	AC
13	X			A
14	X	X		-
15			X	C
16	X		X	A
17		X	X	B
18		X		-
19		X		-
20			X	C
21		X		C
22	X		X	AC
23	X	X	X	A
24		X	X	AC
25	X	X		-
26	X		X	AC
TOTAL in %	53.8%	57,7%	69,2%	A: 38,5% / B: 7,7% / C: 53.8%

Table 2 summarizes the duties on documentation of narcotics, Secure Pharm, and the drug availability processes were examined.

The survey for pharmaceutical personnel to estimate, in their opinion, the minimum time required for maximum pharmaceutical care in general (Table 1) took place with a total of 11 pharmacists.

The pharmacists desired time ranked from 5 up to 12 minutes per patient. In median they expect 8.0 minutes to be enough to consolidate with a patient to archive a high level of pharmaceutical care and dispense the medication.

On the other hand, pharmaceutical technicians of whom a total of 26 did answer the survey, recommend a total time of 5,4 minutes to be enough.

This shows, that pharmacists want 32.5% more time to consolidate with a customer.

More than half of pharmacists and pharmaceutical technicians stated that documentation takes up too much time. Almost a third of pharmacists with 63.6% confirm this fact. 45.5% of them and 38.5% of pharmaceutical technicians (= PTA) say that this task is still necessary to fulfill though.

We can find a similar amount of time while capturing the time needed to confirm the Secure Pharm process. The Secure Pharm process is defined by a scan of the packages QR code to first, identify its originality in the Secure Pharm database and second, to abandon it as a submitted package to the patient.

Pharmacists skepticism ranks higher than PTAs here. Only 27.2% or 7.7% state that fulfilling EU Regulation 2011/62/EU (Secure Pharm) is worth the time it takes.

Regarding the time that it takes to check availabilities of a medications and choose one which is suitable, 63.6% of pharmacists state that this task takes up too much time even though the same amount says that the time is still needed to perform the dispensing correctly (Table 3). Interesting on the other hand is the gap of 15.4% of PTA that don't accept the time of choosing the right medication that's available for the patient.

Table 3: Delivery time of the correct drug out of automated stock versus manual cabinet.

	Pharmacy 01 Automated stock		Pharmacy 02 Automated stock		Pharmacy 03 manual cabinet		Pharmacy 04 manual cabinet	
Median distance between counter and stock in meter	3.45m		6.15m		6.85m		8.35m	
	Time in s	Total # of packages	Time in s	Total # of package	Time in s	Total # of package	Time in s	Total # of package
1	17.6	1	18.3	1	28.3	1	32.6	1
2	27.1	2	19.4	1	29.6	1	45.3	1
3	17.5	1	17.9	1	31.7	1	56.6	2
4	15.1	1	20.0	1	38.4	1	43.9	1
5	15.3	1	28.2	2	25.9	1	37.5	1
6	16.7	1	18.5	1	26.1	1	46.1	1
7	16.4	1	19.2	1	45.9	2	66.3	3

8	27.4	2	39.2	3	55.3	2	34.1	1
9	39.8	3	45.3	3	36.8	1	29.1	1
10	41.0	4	19.6	1	34.8	1	38.3	1
11	15.9	1	17.5	1	68.6	2	24.4	1
12	17.3	1	20.2	1	34.9	1	28.5	1
13	57.8	4	29.7	2	54.1	1	43.9	2
14	34.9	2	32.3	2	49.5	2	35.6	1
15	29.3	2	40.1	3	37.3	1	65.7	2
16	28.5	1	28.2	2	70.2	3	54.6	2
17	21.5	1	19.5	1	51.9	2	39.2	1
18	30.1	2	20.4	1	32.1	1	41.1	1
19	26.2	2	39.3	3	42.3	1	38.4	1
20	15.8	1	21.9	1	45.6	1	43.0	1
21	31.4	2	35.7	3	39.1	1	34.3	1
22	17.2	1	20.1	1	34.6	1	32.1	1
23	19.1	1	20.8	1	28.5	1	41.3	2
24	42.5	3	42.5	3	29.9	1	54.2	2
25	17.3	1	20.3	1	29.4	1	31.8	1
26	39.2	3	20.3	1	45.0	2	45.2	1
27	26.4	2	34.5	2	39.2	1	64.3	2
28	18.5	1	19.5	1	38.3	1	54.0	2
29	15.1	1	21.7	1	40.4	1	34.7	1
30	25.2	2	37.4	2	39.3	1	39.2	1
31	29.1	2	20.3	1	29.8	1	32.3	1
32	37.4	3	19.8	1	32.5	2	37.6	1
33	16.3	1	18.9	1	46.5	1	34.5	1
34	19.8	1	21.7	1	32.7	1	29.1	1
35	44.4	4	37.2	2	44.2	1	37.6	1
36	56.8	4	45.7	3	28.4	1	55.3	2
37	18.5	1	48.2	4	56.9	1	87.4	4
38	15.6	1	49.5	4	56.4	2	45.6	2
39	19.2	1	49.3	4	72.8	3	69.1	2

When it comes to gaining time instead of losing time the most interesting examination is delivery time of the correct drug out of an automated stock versus manual cabinet (Table 3).

In median of pharmacy 01 and 02 it takes 3.44 seconds per package per meter until the package is delivered automatically to the counter. The absolute difference is only 1.86 per package comparing 01 and 02. The way of delivery in pharmacy 02 is 3.3 meters longer though. Taking a closer look on pharmacy 03 and 04, in which there is a manual cabinet to store only, the walking distance between counter and stock only differs by 1.5 meters. The time per package in median is 30.64 seconds. That states a time of 4.03 seconds per meter.

In comparison between the automated stock and a manual cabinet, the automated is 14.6% faster than the manual cabinet. This percentage compared to the difference in percent of total time from each 2 pharmacy types of 50.39% (15.44 seconds absolute time automated vs. 30.64 seconds in manual cabinet) will be further discussed later.

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Availability check processes (Table 4) ordering a specific drug takes in median 4.6 seconds. 36% of those checks weren't fully successful, because a defined delivery time was not set via MSV3 standard.

Table 4: Availability check time through different procurement methods.

	MSV3-Standard based availability check		Phone Based availability check
Tryout	Time in seconds	Phone call needed due to unsure delivery time? Yes = X	
1	2.2		45

2	2.8		33
3	4.7	X	61
4	3.9		120
5	8.8	X	47
6	1.4		65
7	4.3		80
8	2.7	X	65
9	5.1		160
10	6.2	X	54
11	4.5		75
12	3.7		88
13	3.2		74
14	3.7		86
15	4.1		87
16	2.9		53
17	4.5	X	45
18	6.1	X	43
19	4.2		77
20	5.6		89
21	6.4		143
22	4.9	X	65
23	5.0		87
24	2.4		63
25	4.6		67
26	4.5	X	46
25	3.6	X	76
Average	4.6	Total 36%	79.8

The fight against drug counterfeiting is done by checking a single packages QR Code (Secure Pharm) at the moment its released to a patient. A manual scan of the package takes 7.82 seconds. The automated scan via WWKS2 done by the automated stock takes 1.26 seconds per package (Table 5). In 32% of those cases done automatically a manual rescan was still necessary due to technical reasons. This added up states that the WWKS2 scan takes 3.76 seconds per package, which is 51.92% faster than a manual scan.

Digital documentation of data found on a patient’s narcotics prescription took a total median time of 38.8 seconds (Table 6). While 26.5 seconds out of this was done at the counter after the patient left the conversation.

A phone call with pharmaceutical wholesalers was still necessary. In comparison a median phone call takes 79.8 seconds. If in 36% of all MSV3 cases a time of 79.8 seconds is added we get a median time of MSV3 availability checks of 33.33 seconds. This is still 58.27% faster.

Table 5: Measuring time between manual access versus access via WWKS2.

Tryout	WWKS2 Access	Manual access still necessary? Yes= X	Manual Access
	Time in seconds		Time in seconds
1	1.1		6.4
2	1.0	X	5.7
3	1.4		8.3
4	1.2		4.6
5	0.9		9.2
6	1.3	X	5.9
7	1		7.5
8	1.1		7.1
9	1.3		13.5
10	0.7		5.5
11	1.2		6.7
12	1.2	X	4.1
13	1.5		7.1
14	1.7		7.3
15	1.1		6.4
16	0.9		8.3
17	1.1	X	6.9

18	0.8	X	5.4
19	0.9		8.4
20	1.0		5.9
21	0.9		9.9
22	1.1	X	6.8
23	1.2		7.5
24	1.4		8.6
25	1.2	X	7.5
26	1.2		8.4
25	1.1	X	6.8
Average	1.26	32%	7.82

Table 6: Time tracking the difference collecting all necessary information with different

Tryout	Digital Data collection	Time in seconds to finish documentation in the back office	Total time in seconds	Manual Data collection
	Time in seconds for preparing patients data at the counter			Total time in seconds for manual documentation in back office
1	22.2	12	34.2	42
2	24.7	34	58.7	39
3	28.5	4	32.5	52
4	21.6	14	35.6	32
5	24.4	12	36.4	55
6	23.6	35	58.6	72
7	26.6	3	29.6	54
8	25.1	6	31.1	56
9	23.2	6	29.2	48
10	22.9	3	25.9	37
11	25.1	6	31.1	47
12	25.4	4	29.4	59
13	24.9	5	29.6	64
14	23.6	9	32.6	67
15	22.7	3	25.7	71
16	22.4	5	27.4	45
17	24.1	45	69.1	63
18	24.6	2	26.6	74
19	22.5	7	29.5	66
20	22.9	27	49.9	49
21	24.1	34	58.1	73
22	25.6	3	28.6	59
23	21.3	5	26.3	63
24	29.1	6	35.1	54
25	26.1	7	33.1	43
26	27.4	4	31.4	74
25	22.8	12	34.8	64
Average	26.5	-	38.8	60,88

Data collection methods.

Manual collection on cardboards takes 60.88 seconds in total per package and is fully done in the Back office. This results in a 36.3%-time gain.

DISCUSSION

Pharmaceutical care has been accepted as one of the most important roles of pharmacist and, when it is correctly introduced in practice, has shown to have a positive impact on patient health results and quality of life.¹³ While pharmacists wish to take 8 minutes to fully serve a patient’s health status, pharmaceutical technicians would finish with the dispensing in 32.5% less time.

Pharmacists use their professional knowledge they achieved during their studies and so require more time for the pharmaceutical care activities. EU-Regulation tasks like the Secure Pharm process, prevent them as they state, to fully use the time they have per patient to perform pharmaceutical care activities to optimize the patients’ health by checking up of their

medication. They use up time for other tasks such as Secure Pharm which they would need for the patient consultation.

A digital solution such as connecting an automated stock system via WWKS2 to the AMIS databank (Medication Information System AMIS) can save on average 51.92% of time needed for the Secure Pharm scan task and therefore more time is available for consultations.

In order to dispense the medication, automated stocks furthermore offer a modern and digital solution. While automated stocks don't appear to be much faster when we correlate the time per package per meter, we must admit that the difference comparing the manual cabinets picking time is increasing when the walking distance increases.

And the total time per package is still indeed over 50% faster. On the other hand, using an automated stock doesn't force pharmaceutical personnel to move away from the patient. He can fully use all time the automated stock needs, to consult with the patient meanwhile. The time gain can be used for example to show the outer package to the patient, so different package design that occurs frequently doesn't confuse and adherence won't decrease.

The daily routine taking place in German and European pharmacies is already largely done with the help of computer software to supply an individual patient.

Using MSV3 query standards to clarify availabilities of medications that are not on stock locally helps solving difficult situations, in which patients demand their urgent medication but pharmacies are forced to postpone those without giving out a delivery time. The possibility using the time saved (58.27% faster) can be used for example to explain the urgent medications safe application, or do a side effects check on the patients existing prescriptions.

Another software solution is set with automated data collecting from prescription forms while the patient is at the counter.

Scanning paper-based prescriptions to collect all necessary data and then finishing documentation in the back-office results in over 36% total time gain. A downside is that this work needs to be done while the patient is at the counter, or shortly after.

While a paper-based documentation is not done at the counter, it still takes up more time to collect data manually. The negative effect of being at the counter without consulting the patient directly minimizes itself by the total time being gained, in which a pharmacist can consult another patient.

In general, we can say that the hypotheses that states out digitalization saves time that can be used for improved pharmaceutical care is applicable. In every field and its digital solution, a time gain has been reached. The study is limited by some aspects, which could occur since there are various technology providers and systems. For example, there are more than just one company to offer technical solutions for automated stock systems in pharmacies. The total time that can be saved due to digital technologies and software should be calculated with a focus on local circumstances.

CONCLUSION

In conclusion, our study points out, that in a time where digital trends come faster and get offered for pharmacies to use, community pharmacists should take action and follow some of those trends not to get outrun. Our results indicate that in each of the examined processes a considerable amount of time can be saved thus allowing investing into a focused conversation at the point of dispensing with the direct contact to the patient to perform better and extensive, regular pharmaceutical care than with less time. So, our results highlight, that digital options create new possibilities for pharmacists to create more room in the daily business to increase GPP generally.

In general, this study points that digital options create new possibilities for pharmacies to create more room in the daily business to increase GPP generally.

REFERENCES

1. ABDA. Numbers, Data, Facts 2018. (German Pharmacies Association). https://www.abda.de/fileadmin/user_upload/assets/ZDF/ZDF_2018/ABDA_ZDF_2018_Brosch.pdf. Accessed 21.10.2019.
2. ABDA. Density of Pharmacies in Europe. <https://www.abda.de/en/pharmacies-in-europe/density-of-pharmacies-in-the-eu>. Accessed 21.10.2019
3. ADAS. Association of German Pharmacy Software Developers. http://www.adas.de/images/pdf/Schnittstelle_11401_210504.pdf. Access 20.10.2019
4. AMIS. Access to AMIS. <https://www.pharmnet-bund.de/dynamic/de/arzneimittel-informationssystem/index.html>. Accessed: 19.08.19.
5. Crown J. Review of Prescribing, Supply and Administration of Medicines 1999; NHS Executive: Department of Health. Final report.
6. Darzi A. High Quality Care For All: NHS Next Stage Review Final Report 2008. Accessed: 08.07.2019.

7. Department of Health. A Report from the NHS Future Forum: Education and Training 2011. London: Department of Health.
8. EU Regulation 2011/62/EU. https://ec.europa.eu/health/sites/health/files/files/eudralex/vol-1/dir_2011_62/dir_2011_62_de.pdf. Accessed: 19.08.19
9. Filipa A. Costa, Claire Scullin. Provision of pharmaceutical care by community pharmacists across Europe: Is it developing and spreading? *J Eval. Clinical Practice*. Volume 23, Issue 6. 2017.
10. General Pharmaceutical Council. *Future Pharmacists: Standards for Initial Education and Training of Pharmacists* 2011. London: GPHC.
11. Roughead EE, Semple SJ, Vitry AI. Pharmaceutical care services: a systematic review of published studies, 1990 to 2003, examining effectiveness in improving patient outcomes. *Int J Pharm Pract*.2005;13(1):53-70.
12. Scottish Government. *eHealth Strategy. 2011–2017*. Edinburgh: Scottish Government. 2011