Introduction

Improving the quality of life of the population is one of the key directions of any state. In the context of a global pandemic, the main way to achieve this direction is to ensure the availability of high-quality medical care through primary health care (PHC) [1].

Improving the provision of medical services and modernizing PHC requires qualitative and quantitative changes in the provision of health-care organizations with medical workers and the distribution of their functionality and workload. In this regard, the key direction of the State Program for the Development of Healthcare of the Republic of Kazakhstan “Densaulyk” for 2016–2019 was the shift of emphasis “from the use of outdated staff norms and standards to the possibility of flexible planning of human resources and labor costs in accordance with the applied technologies, standardized operating procedures, and needs of patients” [2].

PHC reforms include delegating a number of doctor’s duties to nurses, introducing a new role of a nurse, digitalizing healthcare, improving the logistical base of medical organizations, and opportunities for a modern diagnosis and treatment process. These require the formation of new approaches in the activities of a general practitioner (GP) and justification of labor standards [2], [3].

The main aim of this work is to study the working time spent by GP on outpatient appointment.

Methods

The research was carried out in accordance with “Methods of developing working time standards
and workload of health workers” designed by
Federal Research Institute for Health Organization
and Informatics of Ministry of Health of the Russian
Federation [4]. There is a special timecard that has
been developed to conduct the 2-week (10 working
days) timekeeping research of GP’s appointment time
management (certificate of state registration of rights
N834 of 26 April 2017).

The main purpose of the study is to update the
labor standards in medical organizations and to justify
labor standards in case of deviations from industry
standards.

The timing of the timekeeping research should
be sufficient to obtain evidence of labor costs for all
labor operations.

Before the study, a list of labor operations and
types of work included in the functional responsibilities
of the GP was determined. Five types of GP’s activities
have been identified: Main, auxiliary, working with medical
records, conversations related to work, and personal time.

1. Main functional responsibilities: Physical
examination, percussion, palpation, auscultation, blood pressure measurement,
thermoregulation, respiratory rate, anthropometry, and medical diagnosis;
2. Working with medical records: Examination
and management of medical records;
3. Auxiliary functional responsibilities:
Preparation for work, technical break for
disinfection, if necessary (contagious patients
– measles, rubella, tuberculosis, pediculosis,
etc.), timeout;
4. Official duties: Conversations with staff related
to work, participation in working meetings, and
consultations;
5. Personal time.

Research materials

1. All labor operations of the medical staff during
the unbiased control of the patient’s diagnosis,
which was referred to a specialist during the
timekeeping research, were registered in the
“Time control card,” which was adapted.
A separate timecard was developed to conduct
a timekeeping research of the time spent by the GP in
the clinic.

In this case, to prevent data transfer and loss,
it is numbered on the “Time control card”. The control
card contains information about the employee (name),
specialty, medical organization (full name), year, month,
date of the control, the time of the beginning, and end of
the control. It also shows the total number of registered residents of the clinic and the number of residents
registered to a specialist.
2. Before starting the time control, the “Specialist
control card” was filled out in consultation with
the specialist. All fields on the control card
are filled in clearly and completely. Only one
“Specialist control card” is opened for one
specialist to be monitored.
3. Age, category (according to the WHO age),
purpose of visit (first and second visit), and
other data of the patient who came to the
doctor’s office were filled in the “Patient card.”

The process of timekeeping research is carried
out for two to three specialists who hold the same
position (for example, two GPs) from Monday to Friday
for 2 working weeks. A clock (stopwatch) must be used
during the study.

Thus, during the timekeeping research, each
medical worker must have two Mondays, two Tuesdays,
two Wednesdays, two Thursdays, and two Fridays.

The timing of this timekeeping research should
be sufficient to obtain evidence of labor costs for all
labor operations.

The following methods of statistical analysis
were used: Analytical, mathematical, and chronometric
measurement of simultaneous monitoring. Extensive
and intensive values were calculated. This study
included six pilot regions of the republic where medical
universities are based.

A total of 28 GPs participated in the timekeeping
research. The number of required values was calculated
according to the formula:

\[ N = \frac{2500 \left(C^2 \left[Cs - 1\right]^2\right)}{\left(A^2 \left[Cs + 1\right]^2\right)} \]

C – Coefficient corresponding to a given
confidence level (with the confidence level 0.95 C = 2)
Cs – Standard coefficient of chronosequence
stability (Cs = 2.5)
A – Required observation accuracy (A = 0.95).

In accordance with the calculation results, the
number of measurements should not be less than 2035.
Within the framework of the study, 5853 measurements
were carried out, which are 2.8 times more than the
required number.

Results

In each city, two polyclinics were randomly
selected (Figure 1.), in which two GPs were selected
for research. Research was carried out over 2 weeks
(10 working days) during the hours of appointment,
which on average takes 4 h. The obtained data on the
time spent by GPs were recorded into the time-keeping
sheet which includes the order and name of labor operations and labor costs for the current time. The city of Karaganda was chosen as the main region, where the study was carried out in four polyclinics: No. 1, 3, 4, and 5. The study involved eight GPs [5], [6].

Rational allocation and use of working time are the key aspects of ensuring labor results. At present, the quality and availability of medical services to the population are especially relevant. This study is aimed at analyzing the timing of the work of GPs in the context of health-care reform and the introduction of new medical technologies.

The need to study the timing, distribution, and use of working time is the main purpose of expanding resources to improve the provision of quality outpatient care.

A total of 28 GP’s participated in the timekeeping research. Work experience of GP’s varied from 1 month to 28 years.

The time of the initial appointment and the time spent on the patients who returned for follow-up appointment were recorded separately (Table 1).

As you can see, in the polyclinics of Astana and Almaty, the number of secondary appointments is 1.2–1.1 times higher than the initial appointments. In other regions, the initial appointments rate is higher compared to those who came back. The highest rate of initial appointments is in Aktobe; in comparison with the secondary appointment rate, it is 2.5 times higher.

During 10 working days, the largest number of patients was observed by one doctor in the clinics of Almaty, Semey, Shymkent, Karaganda, more than 200 people. The lowest is observed in Aktobe and Astana clinics.

On average, one doctor has 17 (Aktobe) to 22 (Almaty) patient appointments per day (Figure 2).

On the basis the data of time monitoring, the average values of the initial and follow-up visits of patients to one doctor per day were obtained (Figure 3).

The highest workload was identified in the following cities: Almaty (22.6 patients), Karaganda...
(22.5), Shymkent (21.5), and Semey (21.1); the lowest in Aktobe (18.4) and Astana (19.6).

In general, the comparative analysis shows that even if all patients receive the same admission time of 15 min, and one patient receives the first admission (20 min) and the second admission (7.5 min) at different time costs, there is little change in time expenditure. Deviation error is from 0.1 to 0.6 h (Table 2 and Figure 4).

Only in Almaty and Astana, the time difference for each patient to receive the same 15 min, regardless of the time of the first or return visit to the doctor, increased by 0.6 h.

Given that the average appointment time for one patient is 15 min (Table 3) (by the Order of Ministry of healthcare of the Republic of Kazakhstan N238 of 7 April 2010), and also knowing the average number of patients admitted for 1 day by one doctor, we calculated the time required for an appointment (Figure 5).

As shown in Figure 5, the time spent by a GP during the initial appointment of one patient ranged from 14.9 min (Karagandy and Shymkent) to 16.2 min (Almaty), and the average value (taking into consideration the data from other pilot regions) is 15.3 ± 0.5 min. Keeping in mind that there were both initial and secondary appointments, the weighted average time varied between 14.9 min (Aktobe) and 15.6 min (Almaty).

As a result, the weighted average time spent by a GP during the initial appointment of one patient is 15.1±0.2 min.

In addition, it is very common for patients to come back for a “minute,” including those who have not made an appointment with a doctor and unreasonably take the doctor’s time. For such patients, the advice or attention of a general practice nurse is sufficient.

Among the patients who came to the first admission, those with a simple condition or chronic diseases, those who are on preventive care, or those who receive prescriptions, dispensary control, etc., are common. In such cases, it is necessary to distribute the work to extended practice nurses. When admitting patients, the doctor spends a lot of time filling out medical records, so the nurse (extended practice nurse) should be authorized to perform this service.

The structure of GP’s working time spent on one appointment divided by types of activities: Half of the appointment time is spent on working with medical records (50.2%). About 38.2% of the working time doctor spends on the main activity – the actual appointment. The other types of activities take 11.6% of the working time (auxiliary functional responsibilities, official duties, and personal time) (Figure 6).

The Table 4 calculates the elements of the labor process that a GP/family physician uses per patient. The elements of the labor process include the main activity, document handling, auxiliary activity, official activity, and the necessary personal time.
Classifying the time spent by a GP when working with medical documentation: Computer work (44.4%), filling out medical documents (33.0%), examination of the medical history, including reading of the patient file, laboratory test results, instrumental diagnostics, and consultations (22.6%).

In the timekeeping research of the work of a GP, apart from the above-mentioned types of work, we also analyzed auxiliary activity, official activity, and personal time. According to the study, the working hours spent on these activities were as follows: Communication related to the official activity accounted for 6.7% of the total working time, auxiliary services accounted for 2.7%, and only 2.2% were for personal time.

Discussion

The workload of GP exceeds by 1.3 times the standards of patients admitted by one doctor per day. The number of initial appointments on average is 1.2 times higher compared with secondary appointments. Calculations of appointment time (both initial and secondary) required for one patient correspond with standards of workload. Half of the appointment time is set aside for medical records management.

The results of timekeeping research of GPs' working time at an appointment indicated irrational usage of time due to the work with big volume of medical records. The implementation of a digitalization system and electronic document management will allow the doctor to devote more time to working with patients, which means improving the quality of service.

The workload of GPs differs depending on the socio-economic and demographic characteristics of the regions. In cities with “increasing” workloads, where the proportion of young people is over 50%, most of the time is generally allocated to pregnant women and children. Furthermore, the amount of workload depends on the density of the population and its ratio to the number of medical organizations that provide specialized medical care.

The distribution of time and workload of the GP is directly related to the proper organization (management) of the institution as a whole. Availability of documents in electronic form, pre-registration of patients through the electronic portal, availability of ready clinical protocols, and the work

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Table 4: Distribution of activities of the general practitioner by elements of the labor process during the admission of one patient

<table>
<thead>
<tr>
<th>Elements of the labor process</th>
<th>Seconds</th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Duration of the admission</td>
<td>906</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td>The main activity</td>
<td>346</td>
<td>38.2</td>
<td>100.00</td>
</tr>
<tr>
<td>Greeting the patient</td>
<td>9</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Case history/complaints</td>
<td>80</td>
<td>23.1</td>
<td></td>
</tr>
<tr>
<td>Recommendations</td>
<td>62</td>
<td>17.9</td>
<td></td>
</tr>
<tr>
<td>General examination (inspection of the skin layers, turgor, humidity of the skin, and symptoms)</td>
<td>14</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Examination of the musculoskeletal system</td>
<td>10</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Examination of the oral cavity</td>
<td>9</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Examination of the reproductive organ</td>
<td>12</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Examination of pregnant women (mammary gland, abdomen, and condition of the fetus)</td>
<td>10</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Percussion of the thoracic cavity (heart and lungs)</td>
<td>11</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>Percussion of the abdominal cavity</td>
<td>18</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Palpation (lymph node and thyroid gland)</td>
<td>12</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Palpation (heart, organs of abdominal cavity, and mammary gland)</td>
<td>18</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>Auscultation of the thoracic organs (lungs and heart)</td>
<td>33</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>Measuring the blood pressure (arterial pressure, respiratory rate, and heart rate)</td>
<td>30</td>
<td>8.7</td>
<td></td>
</tr>
<tr>
<td>Anthropometry (height, weight, head circumference, chest circumference, and abdominal circumference)</td>
<td>18</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>2. Document handling</td>
<td>455</td>
<td>50.2</td>
<td>100</td>
</tr>
<tr>
<td>Examination of the medical history (reading of the patient file, laboratory results, instrumental diagnostics, consultations, etc.)</td>
<td>103</td>
<td>22.6</td>
<td></td>
</tr>
<tr>
<td>Filling out the medical records (copying the patient file, preparing the medical certificate, referral for examination, copying the certificate of temporary unfitness for work, referral to other clinics for treatment, registration of the certificate and the prescription, medical and social examination, etc.)</td>
<td>150</td>
<td>33.0</td>
<td></td>
</tr>
<tr>
<td>Working with computer</td>
<td>202</td>
<td>44.4</td>
<td></td>
</tr>
<tr>
<td>3. Auxiliary activity</td>
<td>24</td>
<td>2.6</td>
<td>100</td>
</tr>
<tr>
<td>Putting on the coat and getting dressed</td>
<td>6</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Preparing the desktop</td>
<td>10</td>
<td>41.7</td>
<td></td>
</tr>
<tr>
<td>Handwashing</td>
<td>8</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>Technical break for sanitary cleaning</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4. Official activity</td>
<td>61</td>
<td>6.7</td>
<td>100</td>
</tr>
<tr>
<td>Phone calls to medical staff</td>
<td>15</td>
<td>24.6</td>
<td></td>
</tr>
<tr>
<td>Classes with medical staff</td>
<td>10</td>
<td>16.4</td>
<td></td>
</tr>
<tr>
<td>Participation in working meetings</td>
<td>13</td>
<td>21.3</td>
<td></td>
</tr>
<tr>
<td>Talking to medical staff</td>
<td>23</td>
<td>37.7</td>
<td></td>
</tr>
<tr>
<td>5. Required personal time</td>
<td>20</td>
<td>2.2</td>
<td>100</td>
</tr>
<tr>
<td>Personal time (break, etc.)</td>
<td>20</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6: The structure of GP's working time spent on one appointment divided by types of activities

The largest amount of working time in the main clinics under study was devoted to the collection of the patient's medical history (23.1%), followed by the time devoted to recommendations and auscultation of the thoracic organs (17.9% and 9.5%, respectively). Classifying the time spent during the general examination of a patient separately: Greeting the patient and examination of the oral cavity (both 2.6%), general examination (4.0%), examination of the musculoskeletal system (2.9%), examination of the reproductive organ (3.5%), examination of pregnant women (2.9%), percussion of the thoracic and abdominal organs (3.2% and 5.2%), palpation (5.2%), measurement of blood pressure, including arterial pressure, respiratory rate and heart rate (8.7%), and anthropometry (5.2%).
of several nurses help to improve the work of GPs and significantly reduce the time spent on filling out medical documents.

**Conclusion**

1. The results of timekeeping research of GPs’ working time at an appointment led to the following conclusions:

2. The number of patients admitted by one doctor per day ranged from 17.8 to 22.4 that on average is 20.6 patients per day (standard – 16 patients/day). At the same time, the largest workload in terms of admitted patients per day was in the following cities: Almaty (22.6 patients/day), Karagandy (22.5), Shymkent (21.5), and Semey (21.1); the lowest – in Aktobe (18.4) and Astana (19.6) but still above the standard.

3. The number of initial appointments on average is 1.2 times higher compared with secondary appointments. The largest difference is identified in Aktobe where the number of initial appointments is 2.5 times higher than that of secondary appointments; however, the number of admitted patients per day (18.4) is lower than the average rate (20.6) in general. The exceptions were the GPs of Almaty and Astana, as they experienced an increase by 0.9 times in the number of patients who came for a second appointment.

4. Calculations of appointment time (both initial and secondary) required for one patient revealed that the average rate for initial appointment is 15.3 ± 0.5, for secondary appointment 15.0 ± 0.2, keeping in mind that the average appointment time for one patient is 15 min (15.1 ± 0.2).

5. The structure of GP's working time spent on one appointment divided by types of activities shows that half of the appointment time is set aside for medical records management (50.2%) and 38.2% is spent directly on working with patient.

**Ethical Approval**

Ethical Approval was given at Karaganda Medical University (assigned number 246, protocol number 104).

**Author Contributions**

Each author has contributed to the following items (1) concept or design, (2) data collection, (3) data analysis or interpretation, (4) manuscript drafting, and (5) critical revision of important intellectual content.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

**References**


