

Evaluation of Staff Satisfaction After Implementation of a Routine Work Checklist in an Oral Outpatient Department and Its Effect on Work Efficiency

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Abstract

Objective: To evaluate the feasibility, effectiveness and sustainability of using a checklist in the routine work of a stomatological outpatient department and investigate the satisfaction of the nursing staff with the checklist.

Methods: The study was divided into two stages: design and manufacture the checklist and apply the checklist. After the expert group performed stage one, an analysis of work efficiency and work omissions and a survey of staff satisfaction were carried out. The results of the groups either using the checklist (n = 14) or not (n = 14) were analysed and compared.

Results: The average time of the checklist group was 14.14±0.81 min, and the average time of the nonchecklist group was 26.07±2.37 min, P < 0.001. The working efficiency of the checklist group was significantly higher than that of the nonchecklist group. The omission rate was 0% in the checklist group and 21.43% in the nonchecklist group. Staff satisfaction with the use of the checklist was high.

Conclusion: The checklist can make routine work more efficient and convenient in a stomatological outpatient department. It is recommended for use in stomatological outpatient departments or hospitals.

Introduction

Since its publication in 2009, the World Health Organization's Surgical Safety Checklist has been impressively successful and widely used in medicine^[1]. Surgical safety checklists are used to facilitate teamwork, share important clinical information, and effectively prevent errors or omissions^[2]. The implementation of surgical safety checklists worldwide has resulted in significant reductions in operation-related complications and mortality^[3-4].

In oral outpatient medical activities, there are few reports on oral professional medical complications. This may be related to insufficient data collection or to the reluctance of practitioners to report incidents for fear of losing clients or revenue. Injury (10%), medical emergency (6%), aspiration or ingestion (4%), adverse reactions (4%), and dental placement or extraction errors (2%) are the major complications reported in the literature^[5]. Therefore, in 2018, a safety checklist for oral and maxillofacial surgery was designed and applied to clinical work. Statistical analysis of medical staff satisfaction and postoperative adverse events showed that staff had a high degree of satisfaction with the use of the checklist. In addition, team communication was effectively improved, the pressure level during the operation was reduced, and the frequency of postoperative adverse events was significantly reduced^[6]. Check-ups are commonly used in a range of complex medical activities, including procedures for validating the safety of surgery, implementing hospital sensation control procedures, and routine care in the hospital^[7-9]. In healthcare, checklists have unique advantages, including mobility, flexibility and visibility of work^[10]. However, checklists do not receive enough attention in general hospitals or oral clinics, which may be due to the variable workflows or the inability to identify appropriate checklists^[11-12]. Since there are few reports on the application of checklists in the routine work of stomatology outpatient departments, this paper discusses their applications and advantages.

The routine work of the dental clinic is equally important to routine medical work, which covers work associated with nursing, hospital sense, epidemic prevention and control, use of equipment and so on. The daily work of the oral outpatient department carried out by the nursing team guarantees safe, orderly and smooth medical activities. However, due to many daily work items and too many paper records, the work efficiency is low and some items are even omitted, which virtually increases the workload of the nursing staff. Our aim was to use a checklist to organize, simplify and make the routine work of the dental clinic more efficient, to evaluate the feasibility, effectiveness and sustainability of using the checklist in the routine work of the nursing staff and to investigate the satisfaction of the nursing staff with the checklist.

Materials And Methods

This study focused on a checklist of the daily work performed in an oral outpatient department. This complicated daily work was organized to improve the efficiency of carrying out each task and to prevent the omission of work. The study was divided into two phases:

- (1) Designing and producing an inspection form;
- (2) Applying the checklist.

2.1. Designing and producing the checklist

The goal was to design an easy-to-use, time-saving checklist. This study was conducted based on the daily work of the outpatient department of our hospital. Before the start of daily diagnosis and treatment activities, the nursing staff should determine the hospital sense and complete equipment inspection and maintenance, epidemic prevention and control, etc., to ensure the safety and normal progress of medical activities. The items for routine inspection included the following: air disinfection machine, indoor temperature and humidity, refrigerator temperature and humidity, dental chair and terminal disinfection, soaking liquid (to determine if replacement is needed), ultraviolet disinfection, teeth cleaning machine water storage tank cleaning, leading examining table disinfection, preview triage table disinfection, instrument equipment disinfection, air compressor, video room, ultraviolet disinfection, sewage pump operation, negative pressure pump, pure water machine, and medical staff temperature measurements. Before the development of the checklist described in the current study, recording the completion of each daily inspection task required searching more than 10 other forms, which was a cumbersome process. Figure 1 depicts the record sheet applied in our outpatient department before the use of the checklist. In the checklist described herein, we simplified and organized the work and classified all the inspection items into three categories: 1) clean and disinfect surfaces; 2) inspect and maintain equipment; and 3) maintain environment and health. According to the actual situation of the outpatient department, the order of the examination items was adjusted from top to bottom to avoid repetition of the route and omission of the examination items.

All the items on the checklist were based on the daily work list (Figure 2), and all users were required to mark "yes" or "no" on the checklist based on whether each item was completed or was in good working condition. If there were abnormalities or problems related to the inspection items, the problems were traced back and solved in a timely manner, and detailed explanations were provided in the Remarks column of the inspection form. Finally, each user was required to sign and date the inspection form. Notably, the limited paper size limited the number of checklist items; however, to avoid one or more large sheets of paper, which would be inconvenient, the work was sorted, integrated, and ordered to keep the list comprehensive and concise.

2.2 Application of the checklist

The outpatient routine work checklist was implemented in our hospital at the beginning of 2021, and the clinical application study of the checklist and the questionnaire evaluation of nursing staff satisfaction were conducted from May 1, 2021, to May 14, 2021. The study was approved by the Ethics Committee of the School of Stomatology, Shanxi Medical University (No.2020SLL007). This study was conducted in the outpatient department of our hospital, and informed consent was obtained from all subjects enrolled in the study. The participants were divided into two groups: the experimental group (n=14) that used the checklist and the control group (n=14) that used the original form. A nursing staff member in the experimental group and a nursing staff member in the control group performed outpatient routine work examinations at the same time every day, and the data were collected for 2 weeks (14 days) and then analysed. We evaluated three aspects associated with the use of the checklist, and our specific research questions were as follows:

Study Question 1: Can the implementation of a daily work checklist improve work efficiency and shorten the inspection time?

The inspection time of each nurse in the experimental group and the control group was recorded for statistical analysis.

Study Question 2: Can the implementation of a routine checklist reduce the incidence of omissions of inspection items?

This study included a total of 16 items of daily outpatient work. The number of items missed by each staff member in the experimental group and the control group was recorded, and the omission rate was calculated (the occurrence of omissions was expressed as a percentage) for statistical analysis.

Study Question 3: How satisfied are the nursing staff with the implementation of the routine work checklist?

By means of a questionnaire survey (Table 1), each staff member in the experimental group and the control group scored specific questions in the questionnaire, which were divided into five grades: Strongly Agree (5 points), Agree (4 points), Neutral (3 points), Disagree (2 points), and Strongly Disagree (1 point). According to the scoring situation, each question in the questionnaire was statistically analysed.

The specific contents of the questionnaire were as follows:

- ☐. I can clearly remember everything I need to check;
- ☐. My inspection items are not easily omitted;

- ☒. I had relatively little time to check;
- ☒. My inspection operation process is relatively convenient;
- ☒. I can complete all the inspection items by myself;
- ☒. My checklist is relatively easy to keep;
- ☒. My workload has been reduced;
- ☒. Work records can be easily searched;
- ☒. I can conduct the inspection in an orderly way, not in a hurry;
- ☒. I can timely and clearly record the problems encountered during the inspection.

2.3 Statistical methods

The data results were collated using the spreadsheet program Excel 2007 (Microsoft Corp, Redmond, WA). Statistical analysis was performed using SPSS 22.0 (IBM Germany GmbH, Eningen, Germany) software. The average checking time, omission rate and scores of each question in the experimental group (checklist group) and control group (original form group) were calculated, and the measurement data are expressed as the mean \pm standard deviation. The one-way ANOVA test was used for comparisons between groups, and a P value less than 0.05 was considered significant.

Results

3.1. Experience in the first execution of the checklist

The design and production of the daily work checklist was simple and clear, and the staff participating in the daily check did not complain about it. The overall feedback was that the checklist was more convenient than the previous record sheet. However, we have summarized our experience below. During the implementation of the checklist, after discussion between experts and staff, it was found that there was still room for improvement both in the checklist items and in the checklist process carried out by the staff.

The checklist made our daily inspections easier and more organized, but it also placed higher demands on the staff. We designed the checklist to maximize convenient labour standards to complete daily inspection work. The original form led to disorderly work, but the new checklist helped the staff address all items in an orderly and efficient manner. It required every nursing personnel to examine all of the projects and operations and have enough understanding to do so, and such skills can make the whole process smooth, efficient, and high quality.

3.2. Work efficiency

We performed statistical analysis on the time spent by the staff of the experimental group and that of the control group to complete the outpatient routine work inspection on each of 14 days. The statistical results are shown in Table 2:

The average time of the experimental group was 14.14 ± 0.81 min, and the average time of the control group was 26.07 ± 2.37 min. The data of the two groups were compared between the two groups, and SPSS software was used for one-way ANOVA tests. The results were significant at $P < 0.001$ and showed that the time of the experimental group was significantly lower than that of the control group, and the work efficiency of the experimental group was significantly higher than that of the control group (Figure 3).

3.3. Work omissions

Across the 14 days of data collection, the control group had a total of three project omissions, namely, one omission of the triage surface disinfection inspection and two omissions of the medical personnel's body temperature measurement; the omission rate was 21.43%. The omission rate for the experimental group was 0% (Table 3). This result shows that the designed routine work checklist can effectively reduce the incidence of work omissions when applied to practical work.

3.4. Employee satisfaction

The questionnaire survey results showed that the overall satisfaction of the checklist by the daily inspection staff was high. The staff of the experimental group and the control group scored the 10 questions in the satisfaction questionnaire one by one, and we also collected and statistically analysed the results (Table 4). The results for Questions 1 and 2 (I can clearly remember every item to be checked and my inspection items are not easy to omit, $P < 0.001$) were significantly different between the groups. Compared with those in the control group, the staff in the experimental group were more likely to have comprehensive control over the inspection work, and it was not easy to omit any part of the work. The results for Question 3 (my inspection time was relatively small, $P < 0.001$) were significantly different between the groups. Combined with the results in part 3.2, the use of the inspection form led to more time saved more efficient work. The results of Question 4 (my inspection operation procedure was relatively convenient, $P < 0.001$) were significantly different between the groups. Compared with the inspection checklist designed for this study, the original process required searching in more than 10 forms for each work inspection item, and all the inspection items were disordered, making the work aimless and inconvenient. The results for Question 5 (I can complete all the examination items by myself, $P < 0.001$) were significantly different between the groups. The new checklist of inspection items was more concise and logical. According to the overall pattern and design of the outpatient department, all the examination items can be completed by one route from one point in the outpatient department. A single form can cover all the records of the inspection items. With the original record sheet, it might take two or three people to do the job in the same time. The results for Question 6 (my checklist is easier to save, $P > 0.05$) were not significantly different between the groups. The average score of the experimental group for this item was 3.71 ± 0.47 , while that of the control group was 3.86 ± 0.66 . Both groups scored higher for this question, although the group using the original form might have scored higher. This result was understandable, as each inspection form can be used to record a month's work, while one inspection form is produced every day. On an annual basis, the number of checklists was indeed higher than the number of original forms. The results of Question 7 (my workload decreased, $P > 0.05$) were not significantly different between the groups. The average score of the experimental group was 2.43 ± 0.51 and that of the control group was 2.50 ± 0.52 . These scores make sense given that our initial work mode required two or three staff to cooperate to complete the practical daily work in the outpatient department, but with the new checklist, that work is completed by 1 individual independently. Each participant was required to have an understanding of each task to be completed, including the work process, the qualification standards, the use of instruments and equipment, etc., which allowed the staff to become familiar with all the steps in the process but indirectly increased the work burden in the experimental process. The results for Question 8 (work records can be easily searched, $P < 0.001$) were significantly different between the groups. All the inspection work of each day was recorded in one inspection form, and each form had a record of time. Therefore, no matter whether a certain item or all items in that day were reviewed, the checklist can be searched quickly. The results for Question 9 (I can conduct the inspection in an orderly way, not in a hurry, $P < 0.001$) were significantly different between the groups. The new checklist was organized in a logical manner according to the actual working conditions and structure of the outpatient service; the original form was not organized in this manner, resulting in time wasted. The results for Question 10 (I can timely and clearly record the problems encountered during the inspection, $P < 0.001$) were significantly different between the groups. In the design of the inspection form, we left a column for the problems we found and the problems we solved at the end of the form; this structure was more convenient for recording. There is not enough space in the original form to record the problems and rectification measures in detail, which makes it difficult to find and solve the problems.

Discussion

When we performed the checklist of daily work, it was not completed at one time but was combined with the actual situation of the outpatient department and constantly improved and optimized by using the Plan-Do-Check-Act (PDCA) cycle method. The PDCA cycle, also known as the "quality cycle", is a general management model that originated in the 1920s^[13]. The PDCA cycle method is widely used in total quality management of the scientific path; it can set the project management objectives and content through the plan, do, check, and action cycle stages to achieve the amplification of system efficiency and improve the goal of quality^[14-15]. We completed 7 versions of the daily checklist successively. We conducted trial operations on each version, found problems, and then carried out the next cycle after improvement, including adjusting the checklist order according to the location of the outpatient facility, classifying the checklist items, adding problem feedback and solving the comment column. Relevant experts also discussed that the daily checklist could not be unchanged, and it would need to be adjusted at any time as we found problems in our daily work or updated projects. Therefore, this paper provides only a new idea for our daily outpatient work; we still need to combine our own actual situation, and we can design a suitable checklist under the guidance of the PDCA cycle method.

Is the routine checklist used in dental clinics truly efficient and convenient? We found through the experimental results and satisfaction survey that work efficiency was significantly higher in the experimental group than in the control group, and consistent with the results of Question 3 of the satisfaction questionnaire, the staff using the new checklist exhibited shortened working hours and greater efficiency.

Other advantages of the new checklist based on the satisfaction survey results were as follows: given the logical organization of the checklist, it was difficult to omit a task, the process was straightforward and convenient, and problems could be reported and were easy to find on the form and, therefore, could be identified and solved efficiently.

However, the checklist has limitations. The first is the preservation of the checklist. Due to the limited paper size, we could not fully reflect all the inspection items on one piece of paper. As this research advances, we may need to increase the number of pages associated with the inspection form, which brings problems for the daily preservation of the form. In the long run, there will be a large number of checklists that require more space to keep and are relatively more wasteful of resources. The results of the staff satisfaction questionnaire also identified this problem. Therefore, the next stage of the work plan may be to transition to a paperless process, using tablet computers for carrying out the inspections, filing, and searching, etc., to further improve work efficiency. Additionally, it also better reflects green environmental protection and can save much paper^[16]. The second limitation is that although we increased work efficiency, we actually increased the workload of nurses in their daily work. Because the initial working mode was completed with the cooperation of several people, each nurse was only responsible for the inspection of a fixed number of items. Now, a staff member is required to complete the work independently in order. Although it can save manpower and improve efficiency, it is associated with higher requirements for professional skills. Each nurse must learn each inspection item, including qualified standards, use and maintenance of equipment and so on. Therefore, we should also ensure opportunities for daily inspection staff members to improve their professional skills, which will not only promote the efficient operation of the daily work of the outpatient department but also enhance the careers of the staff, which is particularly important for individuals.

Conclusion

The checklist designed and produced by us makes the daily work of the dental clinic more efficient and convenient. In this paper, results regarding work efficiency, work omissions and staff satisfaction based on a questionnaire were presented. Since there are few reports regarding the routine work of oral outpatient departments or the checklist of medical work, we hope this article provides a new working idea for other medical professionals. However, the checklist was designed according to our actual situation and needs, and others are encouraged to use the PDCA cycle method to produce a unique checklist through continuous improvement.

Declarations

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Authors' Contributions

Z., L.R.,F.Y.,and X.M.wrote the manuscript, contributed to discussion and reviewed/edited the manuscript; W.Z., L.R., X.W., and X.Z. participated in the experiments; Q.W. did the statistical analysis; Q.W. drew the images;all authors contributed to discussion, laboratory support, and discussion, review, and editing of the manuscript.

Competing interests

The authors declare that they have no competing interests.

Statement

All methods were carried out in accordance with relevant guidelines and regulations.

The study was approved by the Ethics Committee of the School of Stomatology, Shanxi Medical University (No.2020SLL007).

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Tables

Table 1.QUESTIONNAIRE OF NURSING STAFF SATISFACTION WITH THE USE OF THE ROUTINE WORK CHECKLIST

Please rate the following 10 questions in the survey of nursing staff satisfaction with the use of the daily work checklist

1
2
3
4
5
 Strongly Disagree Disagree Neutral Agree Strongly Agree

-
- 1.I can clearly remember everything I need to check
-
- 2.My inspection items are not easily omitted
-
- 3.I had relatively little time to check
-
- 4.My inspection operation process is relatively convenient
-
- 5.I can complete all the inspection items by myself
-
- 6.My checklist is relatively easy to keep
-
- 7.My workload has been reduced
-
- 8.Work records can be easily searched
-
- 9.I can conduct the inspection in an orderly way, not in a hurry
-
10. I can timely and clearly record the problems encountered during the inspection

Table 2.INSPECTION DURATION OF THE EXPERIMENTAL GROUP ANG THE CONTROL GROUP (min)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean	SD
Test	13.5	14.2	14.4	12.8	15.3	13.6	14.3	14.2	15.6	13.1	14.2	13.4	15.0	14.4	14.14	0.81
Control	22.6	25.4	24.8	27.5	24.2	28.5	24.5	27.8	25.4	28.6	25.5	26.4	31.0	22.8	26.07	2.37

Table 3.RESULTS OF WORK OMISSIONS

	Number of missing	Rate of missing
Test	0	0%
Control	3	21.43%

Table 4.RESULTS OF QUESTIONNAIRE OF NURSING STAFF SATISFACTION (points)

Question	Test		Control		Significance (p)
	Mean	SD	Mean	SD	
1.I can clearly remember everything I need to check	4.36	0.63	2.57	0.51	0.001
2.My inspection items are not easily omitted	4.86	0.36	3.43	0.65	0.001
3.I had relatively little time to check	4.79	0.43	1.86	0.53	0.001
4.My inspection operation process is relatively convenient	4.57	0.51	2.79	0.58	0.001
5.I can complete all the inspection items by myself	3.71	0.73	2.29	0.61	0.001
6.My checklist is relatively easy to keep	3.71	0.47	3.86	0.66	0.05
7.My workload has been reduced	2.43	0.51	2.50	0.52	0.05
8.Work records can be easily searched	4.57	0.51	2.79	0.58	0.001
9.I can conduct the inspection in an orderly way,not in a hurry	4.71	0.47	1.93	0.47	0.001
10.I can timely and clearly record the problems encountered during the inspection	4.43	0.51	3.50	0.65	0.001

Figures

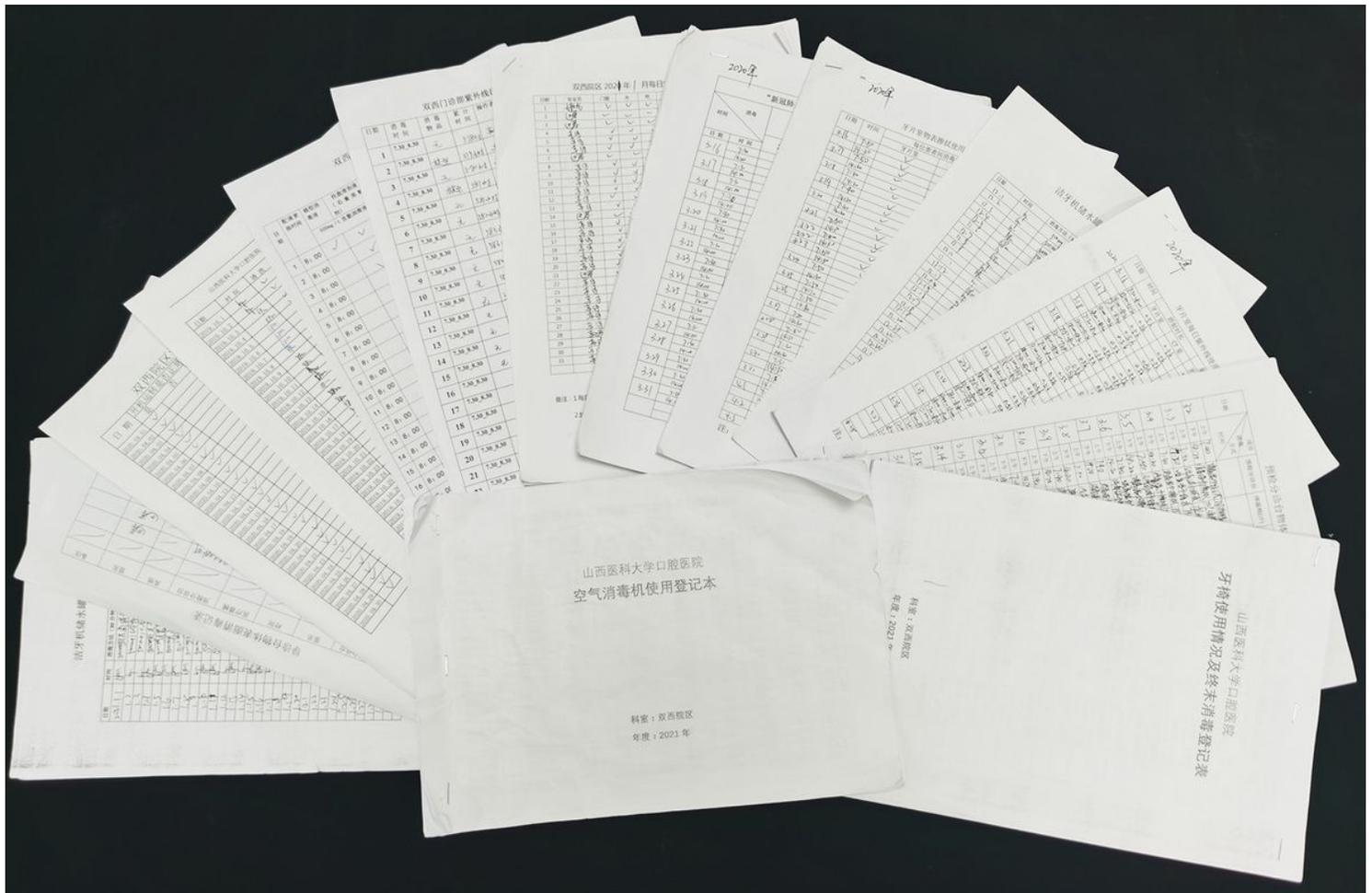


Figure 1

The record sheet applied in our outpatient department before the use of the checklist. Before the development of the checklist described in the current study, recording the completion of each daily inspection task required searching more than 10 other forms, which was a

cumbersome process.

Shanxi Medical University Hospital of Stomatology

Daily Work Checklist

Clean and disinfect the surface	4.Sewage treatment equipment
<p>1.Preccheck triage table object surface disinfection <input type="checkbox"/> 8:00 <input type="checkbox"/> 12:00 <input type="checkbox"/> 14:30 <input type="checkbox"/> 17:50</p> <p>2.Clean and disinfect the water storage tank of the tooth cleaning machine <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>3.Soaking solution replacement (1) Enzyme solution <input type="checkbox"/> Yes <input type="checkbox"/> No (2) Mask immersion solution <input type="checkbox"/> Yes <input type="checkbox"/> No (3) Model disinfectant <input type="checkbox"/> Yes <input type="checkbox"/> No (4) Tray soaking solution <input type="checkbox"/> Yes <input type="checkbox"/> No (5) Instrument immersion solution <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>4.Clean the blinds (1) The first clinic <input type="checkbox"/> Yes <input type="checkbox"/> No (2) The second clinic <input type="checkbox"/> Yes <input type="checkbox"/> No (3) The third clinic <input type="checkbox"/> Yes <input type="checkbox"/> No (4) The fourth clinic <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>5.Dental chair Terminal disinfection (1) Dental chair disinfection <input type="checkbox"/> Yes <input type="checkbox"/> No (2) Pipeline disinfection <input type="checkbox"/> Yes <input type="checkbox"/> No (3) Filter disinfection <input type="checkbox"/> Yes <input type="checkbox"/> No (4) State of dental chair <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>6.Air disinfection machine <input type="checkbox"/> Yes <input type="checkbox"/> No Start-stop time: _____ --</p> <p>7.Ultraviolet disinfection (1) 7:30-8:30 <input type="checkbox"/> Yes <input type="checkbox"/> No The cumulative time: _____ h (2) 14:00-15:00 <input type="checkbox"/> Yes <input type="checkbox"/> No The cumulative time: _____ h</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>5.Sewage treatment station operation (1) Dosing system <input type="checkbox"/> Yes <input type="checkbox"/> No (2) Disinfection device <input type="checkbox"/> Yes <input type="checkbox"/> No (3) Residual chlorine detection <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>6.Add salt to purified water treatment machine <input type="checkbox"/> Yes <input type="checkbox"/> No Add salt: _____ Kg</p> <p>7.Air disinfection machine filter cleaning (1) Panel to wipe <input type="checkbox"/> Yes <input type="checkbox"/> No (2) Remove dust <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
Equipment inspection and maintenance	Environment and Health
<p>1.Negative pressure pump cleaning <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>2.Electric air compressor drains water <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>3.The fridge daily inspection (1) The temperature: _____ °C (2) The humidity: _____ %</p>	<p>1.Indoor temperature and humidity (1) The temperature: _____ °C (2) The humidity: _____ %</p> <p>2.Temperature measurement of medical personnel <input type="checkbox"/> Yes <input type="checkbox"/> No Abnormal personnel: _____ Body temperature: _____ °C Abnormal personnel: _____ Body temperature: _____ °C</p>
Note	
<p>Faults and exceptions:</p>	<p>Department:</p>
<p>Signature:</p>	<p>Date:</p>

Figure 2

Designing and producing the checklist. In the checklist described herein, we simplified and organized the work and classified all the inspection items into three categories: 1) clean and disinfect surfaces; 2) inspect and maintain equipment; and 3) maintain environment and health.

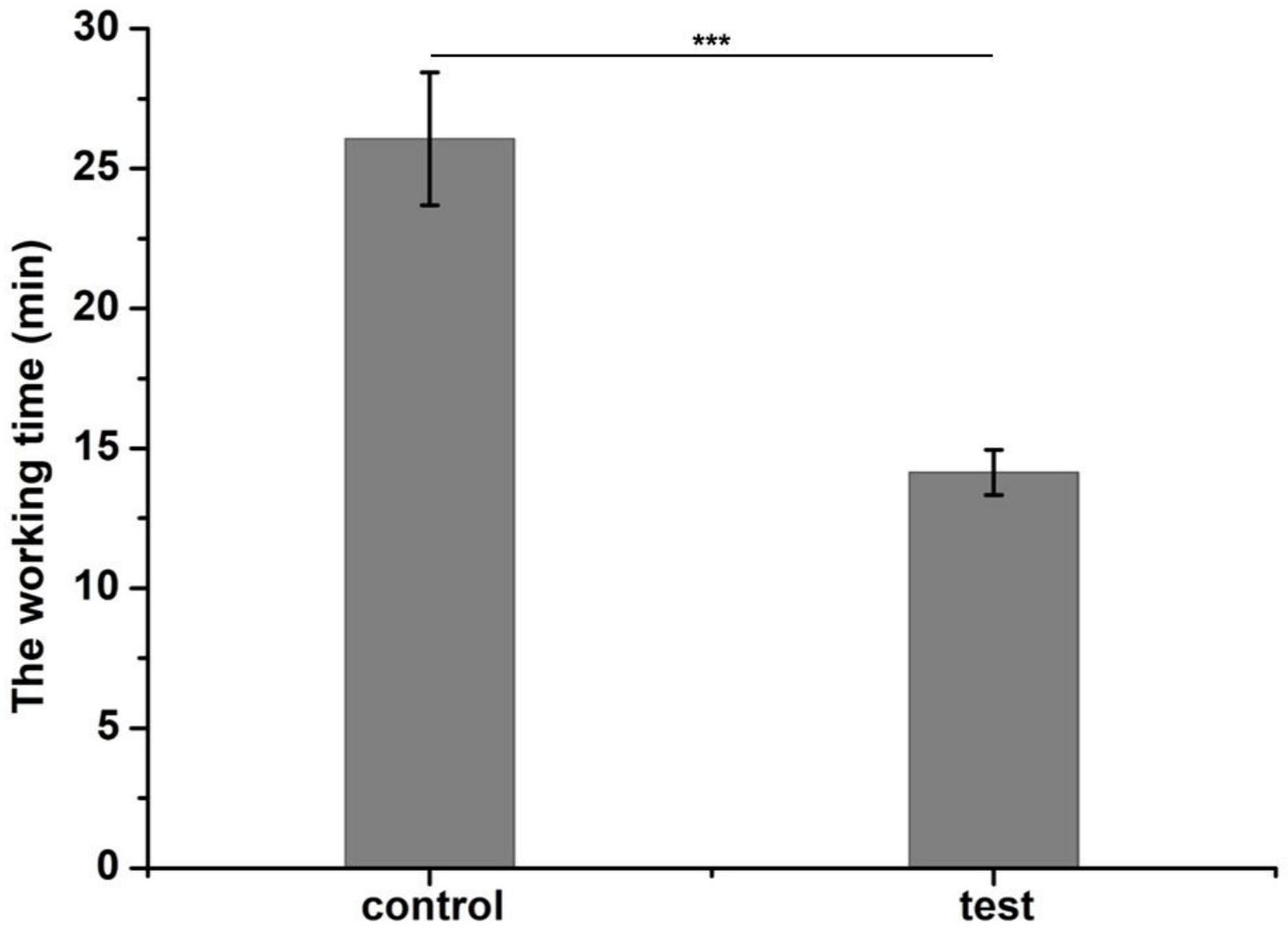


Figure 3

The time of the experimental group was significantly lower than that of the control group. The work efficiency of the experimental group was significantly higher than that of the control group, (Data are shown as mean \pm SD, ***: $P < 0.001$, one-way ANOVA test).