Original Research Article

WhatsApp control: a new norm to succeed in LIMS adoption

Mallikarjun Janardhan Reddy[1]*, A. S. Anand[2], Khajasab[3], Ankur Ankit[3]

[1]Chief Executive Officer, [2]Department of Laboratory Sciences, [3]Department of Hospital Administration, Navodaya Medical College Hospital and Research Centre, Raichur, Karnataka, India

*Correspondence:
Dr. Mallikarjun Janardhan Reddy,
E-mail: dr.m.arjun@gmail.com

ABSTRACT

Background: Adoption of the LIMS (laboratory information management system) serves varied purposes in the diagnostic laboratory and might take a very lengthy period for its implementation. But, without controls being put in place, it can create a barrier to the project's execution and prevent it from being finished on time.
Methods: A WhatsApp group with 22 members, including lab technicians, heads of lab sections, a billing manager, an operations assistant manager, an assistant nursing caretaker, and administrative staff, was created. The assistant operations manager posted the daily pending report status in the WhatsApp group to help the lab team ratify, correct, and complete the assignments. To track pending report closures in real-time, the WhatsApp group mediated weekly follow-ups. The laboratory services department head informed the team monthly on the project's status. The nonparametric Wilcoxon rank test and paired student t-test were performed to compare pre and post-survey responses before and after the seven-month intervention period.
Results: The non-parametric Wilcoxon rank test and paired t-test results of the post-test demonstrated that the participant's answer had improved significantly since the pre-test. The questionnaire showed that participants liked the new WhatsApp control mechanism. The number of pending reports reduced from 4,000 to 240 in seven months, a statistically significant decrease at a p value of 0.01. This supports the newly implemented WhatsApp control.
Conclusions: Based on this interventional study, WhatsApp-based controls can be employed in conjunction with more conventional ways to regulate process outcomes during LIMS adoption.

Keywords: Digital control, HIMS, LIMS adoption, Neutral platform, WhatsApp control

INTRODUCTION

The proliferation of social media in our daily lives can be attributed to the rise of high-speed internet as well as improved and more affordable mobile devices, such as smartphones. WhatsApp is one example of a social media network that has successfully captured the attention of the general public.[1-3] It is one of the most widely used applications for social networking and has gained a lot of traction among young users in recent years.

The first few months of implementing a LIMS shall present a unique set of challenges for the laboratory and the cross-functional team that is participating in the project's implementation. The team needs to overcome many obstacles, such as becoming accustomed to the LIMS environment and the technical jargon of the LIMS application; data entry and meeting reporting deadlines on time are also essential.

The fact that it may take the implementation team a considerable amount of time to become proficient in the fundamentals of LIMS usage, may present a challenge to the implementation process. The second obstacle is a general lack of awareness. The fact that they have only had limited contact with the LIMS environment throughout their job experience is a significant contributor to this lack of understanding. Taking daily

physical updates and holding daily huddle meetings are the typical methods that are utilized in the process of monitoring and supervising the implementation team. However, this strategy can be improved upon by adding a control that is dependent on WhatsApp, where we can leverage the strengths of the project team and technology together.[4]

In this control, pending reports are pulled from the LIMS software by the operations team, which is a cross-functional team. This information is then communicated to the lab team so that they can perform the necessary further steps. This information about the pending report is then sent to the WhatsApp group which comprises members of the lab team, nursing team, and LIMS implementation team. Appropriate data sets when shared with the group will ensure that the situation remains neutral, instead of complaining about the situation. This will also provide an opportunity to communicate with the involved parties (respective section technicians, personnel, and HIMS vendor) in a seamless manner. The purpose and intention are to successfully install the LIMS within the allotted period, with as little difficulty as possible, and to assist the clinical practice in a teaching hospital.

METHODS

The research was carried out in a medical college teaching hospital in the southern region of India, namely Navodaya Medical College Hospital and Research Centre at the department of laboratory services. Participants in this interventional study (from January 2022 to July 2022) included the members of the LIMS implementation team (22 members) in its entirety. Individuals who were not orientated for the LIMS implementation plan, people who had not completed the LIMS module training, Outsourced/contract staff, and LIMS vendor staff responses were excluded from this study. The study was exempt from obtaining ethical approval because it did not involve the collection of personal or confidential information from participants or patients.

The participants in the study were provided with introductory training on the LIMS software, on how to use it practically, updating the status daily, and to be posted on the WhatsApp group. The 'LIMS project' is the name given to the new WhatsApp group that was established. There was a total of 22 people in the group, including representatives of the billing and operations departments who served as facilitators and group administrators.

Hypothesis

H_0 (null)

There is no change, on average, in the LAWAT-08 score, post-implementation of WhatsApp control.

H_1 (alternative)

There is an average change in the LAWAT-08 score, post-implementation of WhatsApp control.

Objectives

To understand the trend of LIMS pending report clearance. To understand the effectiveness of WhatsApp control deployed using the LAWAT-08 scale.

Modus operandi

The study period - In January 2022, the project went live with the LIMS implementation, which was regarded to be the baseline for the research, and July 2022 was considered the project closure month. On a regular and daily basis, the operations team downloaded the reports that were outstanding and shared them with a WhatsApp group in preparation for the future course. Action restrictions were addressed in a WhatsApp group, and the operations team took the lead in moderating the conversation, filling in the gaps, and facilitating the report closures with the assistance of lab personnel. The tone of the chats was easy-going so that team members would not hesitate to post messages. The operations team worked with the vendor to negotiate LIMS template realignment difficulties, value miss-matches, and other technical options to facilitate the closure of pending reports in a more efficient manner.

The daily report upload occurred at 5 p.m., except on weekends. This assured that there was no disturbance to the department's normal operations. The shared report contains information about the test, such as the patient's name, UHID, lab tests, doctors' information, the amount paid, the time the sample was received, the time it was processed, the technician's verification time, and the doctors' verification time. The team was encouraged to seek any clarifications or assistance necessary to complete the reports. In order to assist the lab team, module-specific training materials were also distributed.

It is noteworthy that the 'WhatsApp control' that was introduced worked without a hitch for the seven months leading up to August 2022. The monthly pending report counts were discussed over seven months, and the discussion was moderated by the head of the department and all of the section heads with the technicians along with the administration team, who provided the data inputs, closure status, and action forward plan. This discussion also included the administration team.

The monthly pending report was used as the data point from January 2022 through July 2022, and it was tracked and computed consistently as part of the discussion of pending reports that took place within the department. Obtained data points were subjected to the trend analysis, which significantly showed a decreasing trend.

Survey scale (LAWAT-08)

The survey tool [lab information system adoption and WhatsApp usage agreement test- (LAWAT-08)] was designed and circulated for the response collection from the LIMS implementation team. Content validity for the survey tool was established in discussion with the three subject matter experts, survey tool (LAWAT-08) validity was checked by using the Cronbach's Alpha test (value =0.72), expressing higher internal consistency and reliability.

Two sets of surveys are being conducted one at the start of the project in January 2022 (pre-test) and the second one after seven months in August 2022 (post-test) using the LAWAT-08 survey tool for all the LIMS implementation participants (in WhatsApp group) responses were collected and the scores were kept confidential. The average scores were compared to that of the pre-test score by non-parametric Wilcoxon rank test and paired t-test a p value <0.05 was considered statistically significant.

The pre-test and post-test scores on the LAWAT-08 were collected for the sole purpose of observing the influence that the new control had on the team and the outcomes it produced. They were not used to evaluate the participants' knowledge or ability about LIMS.

Statistical analysis

The survey data set was computed using Microsoft Excel 2019 version. The survey tool (LAWAT-08) validity was checked by using the Cronbach's Alpha test. Frequency distribution tables, the nonparametric Wilcoxon rank test, paired student t-test, and Pearson correlation tests were performed to analyse the survey responses using the SPSS 26.0 version.

RESULTS

LIMS WhatsApp content analysis

Team participation in the group was encouraging. A total of 894 posts were shared by the participants. The posts in the group acted as a seamless connection between the multidimensional team.

Table 1: Content categorization.

Content category	Counts	Percentage
Information	696	78
Assistive	95	11
Encouraging	52	6
Neutral	37	4
Out of topic	14	2
Total	894	100

The transactional content of WhatsApp was categorized under 5 heading for the study purpose, and 78% of the content was for information share followed by assistive (11%), encouraging (6%), neutral (4%) and out of the topic (2%) content represented in Table 1.

LIMS pending reports analysis

The clearance of pending reports in the LIMS implementation was the primary outcome that was anticipated, and using this indicator gave the department the ability to evaluate its functionality more precisely following the LIMS installation.

Following the daily list of pending tests summary that was published in the WhatsApp group, weekly and monthly close physical follow-up meetings were held with the department and multiple sections of the lab to ensure that the momentum was kept going toward the successful completion of the project.

Table 2: LIMS pending reports trend analysis.

Months	Test counts	Pending reports	Percentage
January 2022	5170	2665	52
February 2022	5038	182	4
March 2022	8442	229	3
April 2022	7271	666	9
May 2022	6404	331	5
June 2022	6685	277	4
July 2022	5960	118	2

The collected seven months of data were subjected to trend analysis and it showed a decreasing trend with a 96% change compared to the baseline and the decreasing trend was statistically significant with R^2=0.78 at a p value of 0.05.

LAWAT-08 scale analysis

LAWAT-08 scale (lab information system adoption and WhatsApp usage agreement test) was developed consisting of 8 questions, and content validation was performed by three subject matter experts. The data obtained was subjected to scale validation using the SPSS software; on analysis, Cronbach's alpha test (alpha =0.72) represents the higher internal consistency and reliability of the scale developed.

In totality, 35% positive change was observed from pre- to post-scores as mentioned in Table 3. Orientation and inclusion of neutral platforms had observed a higher positive change, followed by the daily update in WhatsApp and its usefulness for daily function.

Table 3: LAWAT-08 pre and post scores.

Sl. No.	LAWAT-08 scale	Pre scores	Post scores	Change
Q1	I perceive that the orientation session for the LIS implementation shall be beneficial	2.7	4.1	52%
Q2	I had positive vibes when asked to join the LIS group	2.6	4.0	53%
Q3	I perceive that daily updates on the WhatsApp group shall be helpful	2.5	3.7	47%
Q4	I shall monitor the WhatsApp group interactions and updates	2.9	3.6	23%
Q5	I perceive that WhatsApp group updates are relevant to my daily tasks	3.0	3.8	29%
Q6	I perceive that the WhatsApp group will help us to connect seamlessly with a cross-functional team	2.7	3.5	27%
Q7	I perceive that WhatsApp group interaction shall facilitate the implementation of the LIS.	4.1	4.5	11%
Q8	I'm satisfied with the WhatsApp group updates and look forward to continued interaction	2.9	4.0	40%

Table 4: Comparison of LAWAT-08 - pre-post scores.

Paired student t-test for pre and post-LAWAT-08 scores comparison		
	Pre	**Post**
Mean	2.93	4.42
Variance	0.14	0.03
Observations	22	22
P value	<0.01	
Non-parametric Wilcoxon test for pre and post-LAWAT-08 score comparison		
Z value	-2.89	
W value	0 (critical value at n=18 is 22	
P value	<0.01	

Table 5: Correlation for LAWAT-08 scale to overall acceptance of WhatsApp control.

Pearson correlation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Overall
Q1	1								
Q2	0.12	1							
Q3	0.15	0.11	1						
Q4	0.019	0.14	-0.24	1					
Q5	0.44	0.47*	0.23*	0.08	1				
Q6	0.28*	0.16	0.45**	0.02	0.11**	1			
Q7	0.08	0.22	0.17*	-0.14	0.32**	0.28*	1		
Q8	0.34	0.17	0.07	0.24	0.47	0.24	0.16	1	
Overall	0.28	0.37	0.33*	0.13	0.51	0.17**	0.32*	0.14	1

Note: correlation significant at the *0.05, **0.01 level.

A comparison of pre- and post-LAWAT-08 scores was performed using paired t-test and nonparametric Wilcoxon test as mentioned in Table 4. The average LAWAT-08 score post implementation of WhatsApp control (post: 4.42) was found to improve significantly compared to the pre-test value (pre: 2.93) at p value <0.01. Considering the reported analysis, reject the null and accept the alternative hypothesis, and we state that there is a difference, on average LAWAT-08 score after the implementation of WhatsApp control.

Daily updates (question 3), smooth cross-functional link (question 6), and WhatsApp interaction (question 7) all demonstrated a statistically significant correlation to the overall acceptability of the WhatsApp control, with p-values ranging between 0.05 and 0.01.

Hypothesis reporting

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DISCUSSION

When it comes to the execution of the project, having neutral controls can result in numerous beneficial effects.[5,6] The institutions can overcome the communication delays that exist among cross-functional teams with the assistance of these impartial controls. A neutral platform incentivizes the participants to post freely and enables them to debate the issue openly without pointing the finger of blame at the individual who is involved; this ultimately increases the level of cognitive trust that exists between the participants.[5,7] This neutral platform shall help the team get back on track with their execution while also providing a seamless connection and preventing any delays in the process. A neutral platform such as WhatsApp groups, as opposed to direct updates and follow-up meetings, will provide the best way to engage team members positively at their place of work itself. Because of this, a positive dimension (control-trust alignment) will be accomplished, which will result in a reduction in the number of needless process delays and miscommunications.[7] From the perspective of putting the project (LIMS implementation) into action, a positive dimension of this kind will make it easier to put the project on schedule and see it through to its conclusion without any interruptions.

A wide range of medical professionals has experimented with using the messaging service WhatsApp as a tool for education and monitoring.[2,8] Presently millennials make up the majority of the workforce in the front line during the implementation of the LIMS, and because this generation of individuals is comprised of digital experiential learners, such interventions could result in a swift acceptance among the members of the team.[9]

Connectivism and constructivism are the two main theoretical frameworks that underpin the application of social media in the practical business world.[10-12] Connectivism enables users with similar interests to participate in a shared online community and freely share information as a result of their participation. With the use of constructivism, the group can improve upon and constructively act upon the information that has been provided while still maintaining their sense of work dignity, self-identity, and self-respect constructs.

In this day and age, where an emphasis is placed on efficiency, it is absolutely necessary to implement a wide range of technological interventions and neutral platforms to carry out a project that requires the use of physical labour. The job of the project lead when deploying the LIMS is that of a facilitator who moderates the activities and assures the closure of pending reports timely using these neutral platforms alongside the traditional physical follow-ups.[9] This is the essence of the WhatsApp-centric strategy throughout the LIMS implementation.

Controls based on WhatsApp that have been applied serve two goals. The first thing to do is to maintain a fluid connection with the neutral-natured LIMS implementation team.[13] The second step is to quickly moderate and overcome the process impediments while the implementation is being carried out by coordinating the efforts of cross-functional teams.[13,14] However, the ground rules for using WhatsApp for the execution of the LIMS project need to be advised in advance.

As data was posted to the group at a scheduled time daily, which improved the perception of the team towards the outcome expected from the LIMS project and allowed, their interest and participation in the LIMS adoption to improve as time progressed, which contributed to the achievement of greater outcomes. As a direct consequence of improved perception and enhanced trust, the group is excited about the prospect of carrying on with the WhatsApp control that has been introduced to facilitate a smooth connection between cross-functional teams, as indicated by pre-post LAWAT scores (Tables 3 and 4).[4,7] In this study, there was a statistically significant positive link, at a p value of 0.05 and 0.01, between daily updates (Q3), a smooth connection to the cross-functional team (Q6, Q7), and the overall acceptance towards the WhatsApp control (Table 5) by the LIMS implementation team.

The concept of cognitive load serves as the foundation for the e-learning theory that was investigated in this particular research endeavour.[15] The mental workload associated with carrying out a task can be broken down into three distinct categories: relevant (germane), intrinsic, and superfluous (extrinsic). The effort required to make sense of the task is referred to as the relevant (germane) load, the effort required to perform the task is referred to as the intrinsic cognitive load, and the load generated by how the information is delivered to the learner is referred to as the superfluous (extrinsic) cognitive load.

The use of WhatsApp as a control during LIMS implementation at the teaching hospital used these principles in the following way; the information is delivered directly to their cell phones regularly, relieving them of some of their other responsibilities of data collection and validation (reduced extrinsic load). Since everyone in the group knows where to find the information (reduced intrinsic load), they need to take action, there is less confusion (reduced germane load) about what is expected of them. In this way, everyone on the team can take their time to review the information at their own pace and act accordingly. With this, they are better able to handle the mental demands placed upon them during the execution of LIMS implementation.

Positive and significant results came from several studies that used WhatsApp to educate and train future doctors in fields as diverse as microbiology, pathology, psychiatry, preventive medicine, and community medicine.[2,3,15-23] The results of this research imply that selecting the technology-driven option (such as the WhatsApp tool)

helps strike a healthy balance between tight supervision of the project and the team's confidence in its leaders (Table 3) and allowed us to avoid trust-control dilemma.[4,5,24,25]

Positive comments were received from those who took part in the implementation. None of the participants reported any disruptions to their daily lives, and all of them expressed a wish to remain in the group (Table 3). The majority of respondents supported sharing summaries of LIMS project outcomes inside the group to motivate them to put their ideas into action strongly, representing the extended team spirit to move forward with the project execution.[23] Post LAWAT scores have also experienced positive progress, and the change was statistically significant with a p value of 0.01 (Table 4), which indicates that the team is accepting of the new (WhatsApp) control deployment. As a direct result of the LIMS implementation team's increased acceptance (Table 4) of the newly deployed WhatsApp control, the team has developed a positive trust in the project execution and has delivered their best work. In light of the same, we are observing a higher clearance of pending laboratory reports, which has reached 2% from a baseline of 52% in seven months span (Table 2).

This study is limited since there was not a control group that utilized conventional methods to monitor the LIMS deployment, without such a group, it is impossible to compare the outcomes of WhatsApp-controlled execution to those of conventional methods. The conduct of future research on this subject would profit from the inclusion of a larger participant pool drawn from a number of different centers, as well as an increased focus on the ways in which participants' task orientation and employee-oriented leadership might influence the manner in which the project is carried out.

CONCLUSION

It is conceivable to adjudicate or (and) replace the traditional methods of monitoring the outcomes of the LIMS deployment with (data that has been annotated and sent to the participants via smartphone utilizing) the WhatsApp platform as a newer control strategy. This would be a significant improvement over the current situation of conventional controls for the LIMS project execution and implementation. To reap the benefits of 'anytime control and connect', it is vital to deploy technology (WhatsApp) in a planned manner, only then can these benefits be realized.

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