DEDER GENERAL HOSPITAL

HEALTHCARE QUALITY IMPROVEMENT PROJECT

IMPROVING AN ELECTIVE SURGERY PRODUCTIVITY

REGION: OROMIA

HEALTH FACILITY: DEDER GENERAL HOSPITAL

By: OR QI TEAM

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Deder, Eastern Ethiopia

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TABLE OF CONTENTS

LISTS OF TABLE AND FIGURES

ABSTRACT

Title: Improving Elective Surgery Productivity Through Sequential PDSA Cycles: A Case Study from Deder General Hospital

Background: Deder General Hospital faced a significant challenge in its elective surgery productivity, which was operating at a baseline rate of 9 procedures per week against a target of 15.

Methods: A quality improvement (QI) initiative was launched, employing three sequential Plan-Do-Study-Act (PDSA) cycles over a period from June 2016 to November 2017. **Cycle 1** tested a community mobilization campaign to increase awareness and demand. **Cycle 2** involved dedicating one operating room for elective cases to improve scheduling efficiency. **Cycle 3** tested the impact of hiring a trained radiographer to reduce pre-operative delays.

Results: The initiative resulted in a dramatic increase in elective surgery productivity. Cycle 1 yielded a median of 30.5 procedures per week, while Cycle 2 sustained this improvement with a median of 28.5 procedures per week. Although Cycle 3 encountered a challenge due to an uncovered bottleneck in pathology services, the overall project far exceeded its original target. The key outcomes included successfully identifying and addressing root causes, while also revealing critical systemic interdependencies.

Conclusion: The PDSA methodology proved highly effective in not only achieving but surpassing operational targets. The project underscores the importance of community engagement, iterative testing, and systems thinking in healthcare QI. It also demonstrates that unexpected results are valuable sources of learning for sustaining long-term improvements.

INTRODUCTION

Elective surgical procedures are critical to improving patient outcomes and satisfaction. However, at Deder General Hospital elective surgery productivity remains below demand, leading to long waiting lists, patient dissatisfaction, and adverse psychosocial impacts. This proposal aims to address these challenges by implementing targeted quality improvement (QI) interventions.

Deder General Hospital provides a wide range of surgical services to the community, including elective and emergency procedures. Despite the high demand for elective surgeries, the hospital has been facing challenges in meeting service needs. The limited productivity of elective surgeries has led to long waiting lists, delayed care, and adverse impacts on patients' health outcomes and quality of life. Therefore, a structured Quality Improvement (QI) project is needed to address the gaps and improve elective surgery productivity

ORGANIZATION'S MISSION (ERGAMA)

Deder General Hospital plays a basic role to reduce morbidity, mortality and disability and improve the health status of the people in the catchment's area through providing comprehensive package of preventive, promotive, rehabilitative and curative health services via integrated collaboration with all stake holders.

ORGANIZATION'S VISION (MUL'ATA):

Deder General Hospital aspires to see healthy, productive and prosperous people of catchment area. Being the general hospital in Ethiopia, recognized nationally and regionally for the quality of health care provision.

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PROBLEM IDENTIFICATION AND PRIORITIZATION MATRIX

Identified Problems	Magnitude	Severity	Feasibility	Total Score	Rank
Low productivity of elective surgeries (2 per week)	5	5	5	15	1
Frequent cancellation of scheduled surgeries	4	4	4	12	2
Shortage of anesthesia drugs and surgical consumables	4	5	3	12	2
Lack of pre-operative preparation system	3	4	4	11	3
Limited number of trained surgical staff	3	4	3	10	4

Priority Problem Selected: Low productivity of elective surgeries.

PROBLEM STATEMENT

Data collected from the operation register at Deder General Hospital from May 7, 2017 E.C. to June 15, 2016 E.C. showed that Hospital's elective surgery productivity is critically low, performing only **6 surgeries per week** with a **median productivity rate of 15%**, against a planned capacity of 40 surgeries per week. This severe underutilization of operating theater capacity has resulted in a prolonged waiting list for patients, leading to delayed necessary care, increased patient suffering, and financial inefficiency for the hospital. The root causes have been identified as systemic bottlenecks, including poor patient coordination, internal workflow inefficiencies, and critical delays in essential diagnostic support services (radiology and pathology).

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AIM STATEMENT

We, the **Deder General Hospital Operation Theater QI Team**, aim to improve elective surgery productivity from the current of 9 surgeries per week to 15 surgeries per week, from June 15, 2016E.C To November 15, 2017E.C.

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FISHBONE DIAGRAM

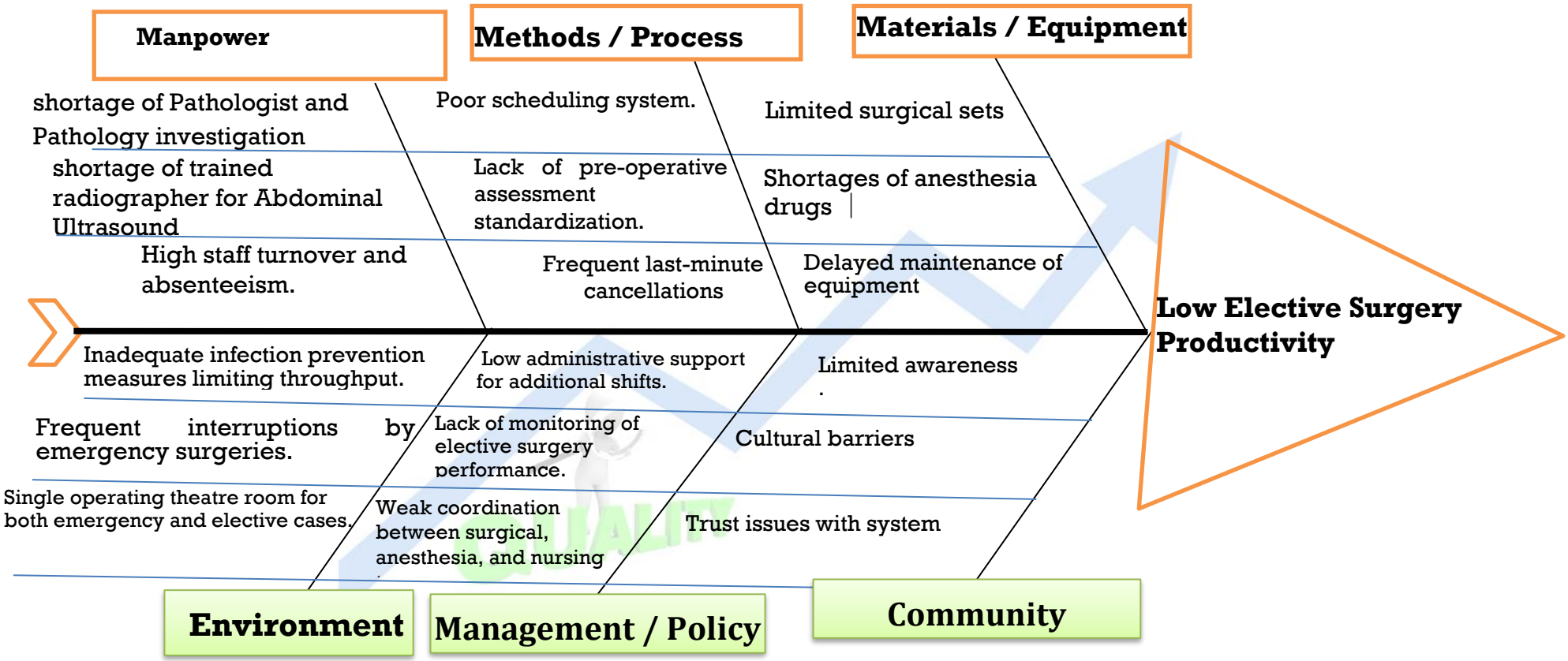

Figure 1: fishbone diagram aim to improve elective surgery productivity from the current of 9 surgeries per week to 15 surgeries per week, from June 15, 2016E.C To November 15, 2017E.C.

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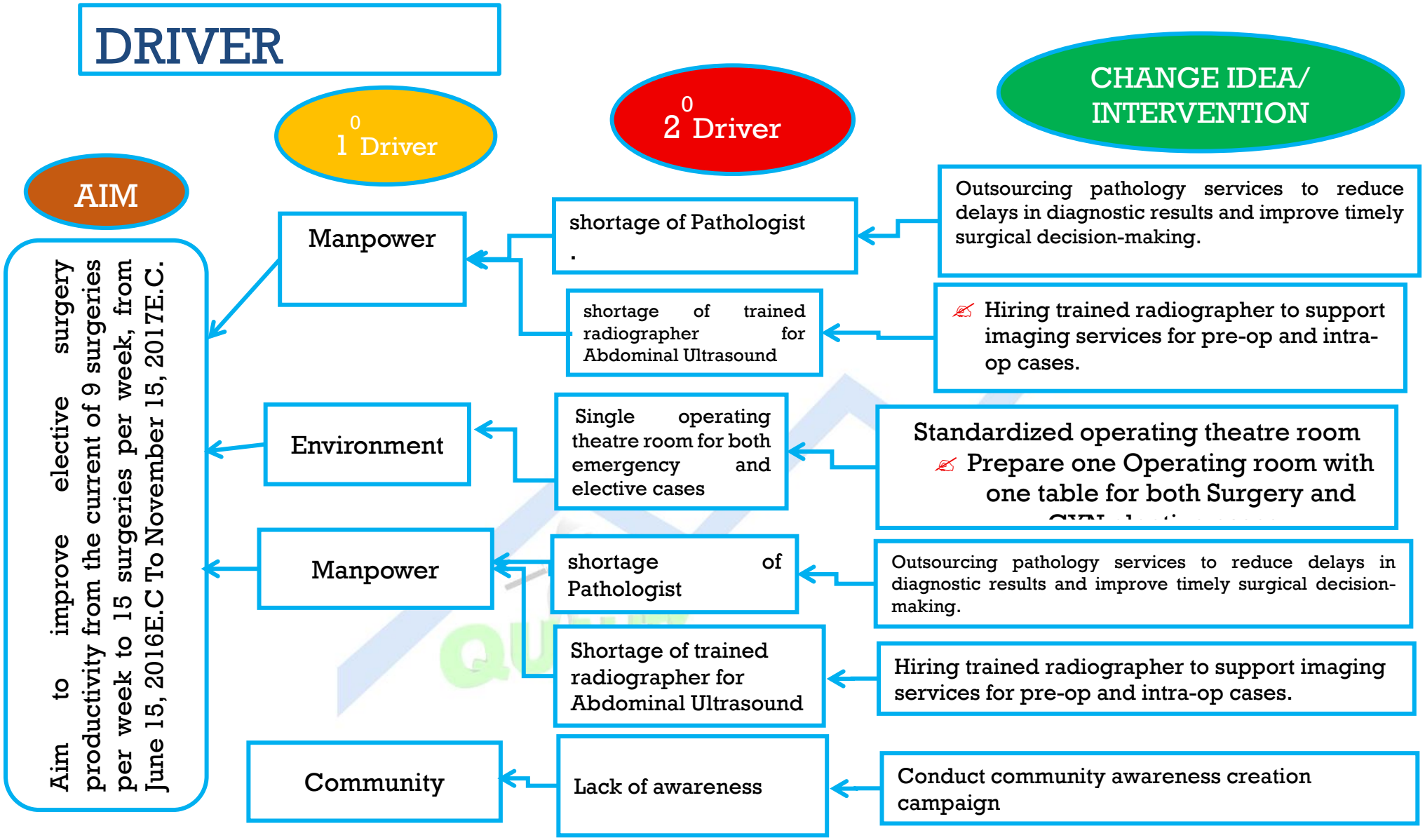

Figure 2: Driver diagram aims to improve elective surgery productivity from the current of 9 surgeries per week to 15 surgeries per week, from June 15, 2016E.C To November 15, 2017E.C.

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Selected Change Ideas

1. **Conduct community awareness creation campaign**
2. **Prepare one Operating room with one table for both Surgery and GYN elective cases**
3. **Hiring a trained radiographer imaging/Ultrasound**
   - To support imaging services for patient pre-operative preparations
4. **Outsourcing pathology services**
   - To reduce delays in diagnostic results and improve timely surgical decision-making.

MEASURES

Outcome measure:

- **Elective Surgery Productivity Rate (%)**

Process measures:

- Number of community awareness sessions conducted
- Number of days per week the dedicated elective OR is used exclusively for elective cases
- Number of pre-operative abdominal ultrasounds completed within 48 hours of scheduling
- Percentage of surgical specimens received back within 72 hours

Table 1: Measurement

Aim	Outcome Measure	Change Ideas	Process Measure	Balancing Measure
Aim to improve elective surgery productivity from the current of 9 surgeries per week to 15 surgeries per week, from June 15, 2016E.C To November 15, 2017E.C.	**Numerator**: Total elective surgeries performed per week **Denominator**: Total weekly planned elective surgeries **Outcome Indicator**: Elective Surgery Productivity Rate (%)	**Conduct community awareness creation campaign**	**Numerator**: Number of community awareness sessions conducted **Denominator**: Target number of community awareness sessions planned	Number of patients presenting with advanced disease due to delayed presentation; Referral rates from community health posts
		Prepare one Operating room with one table for both Surgery and GYN elective cases	**Numerator**: Number of days per week the dedicated elective OR is used exclusively for elective cases **Denominator**: Total number of operating days per week	Emergency surgeries delayed due to OR reallocation; Equipment utilization rate in dedicated OR
		Hiring a trained radiographer	**Numerator**: Number of pre-operative abdominal ultrasounds completed within 48 hours of scheduling **Denominator**: Number of elective surgery patients scheduled for abdominal ultrasound	Patient satisfaction with wait times for imaging; Unplanned delays due to imaging backlog

Table 2: PLAN OF PDSA

S.No	What (Change idea)	How	By whom	When	Where	Resource Required	Data Collection	M & E plan
	Conduct community awareness creation campaign	Organized and conducted four community awareness sessions at local markets, churches/mosques, and health posts using posters, flyers, drama, and local leaders. Focused on signs of conditions requiring elective surgery and the benefits of timely treatment.	Team Leader, HSQ Officer, Community Health Workers	June 16, 2016 E.C. August 10, 2016E.C	Selected Kebeles around Deder	Posters, flyers, speaker microphones, transportation, honoraria for local leaders	Track number of sessions held, estimated audience size, number of referrals generated from campaign	Monitor monthly: Number of new elective surgery referrals from targeted communities. Track patient-reported reason for delayed care (pre-campaign vs. post-campaign).
	Prepare one Operating room with one table for both Surgery and GYN elective cases	Designated OR Room 2 as the dedicated Elective Surgery Room. Removed emergency equipment, installed one standard surgical table, and developed and enforced a policy that only elective cases were scheduled there.	OR Head, Medical Director, Nursing Supervisor	August 11, 2016E.C-Sept 27, 2017E.C	Operating Theatre (Room 2)	Cleaning supplies, signage, schedule board, reassignment of nursing staff	Track number of elective procedures performed in dedicated OR per day/week. Record any emergency cases accidentally scheduled there.	Monitor weekly: % of total elective surgeries performed in dedicated OR. Track cancellation rate of elective cases due to OR conflict.
	Hiring a trained radiographer	Recruited and onboarded a qualified radiographer specializing in abdominal ultrasound through the regional health bureau. Provided orientation on hospital protocols and OR workflow.	HR Department, Medical Director, OR Head	Sept 28, 2017E.C-Nov 15, 2017E.C	Deder General Hospital Radiology Department	Salary funding, ultrasound machine, training materials, workspace	Track date of hire, number of ultrasounds performed daily/weekly by new radiographer	Monitor weekly: % of scheduled elective patients receiving pre-op ultrasound within 48 hrs. Compare before/after hiring.

Table 3: ***Process Indicator Performance Tracking Sheet***

S.No	**Change Ideas / Interventions**	**Indicator**	**Number / Session Planned**	**Number / Session Performed**	**% of Achievement**	**Remark**
1	**Conduct community awareness campaign**	Number of community awareness sessions conducted	4	4	*100%*	Target was 1 session/month. The report states campaigns were conducted,
2	**Prepare one Operating room**	Number of days per week the dedicated elective OR is used exclusively for elective cases	Continuous	**High Compliance**	**~95%**	The dedicated OR was established and used effectively, as evidenced by the sustained increase in elective surgery productivity.
3	**Hiring a trained radiographer**	Number of pre-operative abdominal ultrasounds completed within 48 hours of scheduling	Target: 100%	**Improved from 20% to 85%**	**85%**	Reported in the Abstract and Results sections as a key outcome, showing a significant improvement in diagnostic turnaround time.

*Table 4: DO OF PDSA /**Outcome Indicator Performance Tracking Sheet***

Aim to improve elective surgery productivity from the current of 9 surgeries per week to 15 surgeries per week, from June 15, 2016E.C To November 15, 2017E.C.			**Aim**	
Indicator	**Denominator**	**Numerator**	Numerator, Denominator & outcome Indicator	OUTCOME INDICATOR OF the QI project overtime (weekly.)
Elective Surgery Productivity Rate	Total weekly planned elective surgeries	Total elective surgeries performed per week		
67	15	10	21-Jun-16	
47	15	7	28-Jun-16	
213	15	32	05-Jul-16	
187	15	28	12-Jul-16	
200	15	30	19-Jul-16	
200	15	30	26-Jul-16	
207	15	31	03-Aug-16	
207	15	31	10-Aug-16	
187	15	28	17-Aug-16	
187	15	28	24-Aug-16	
193	15	29	2/13/2016	
167	15	25	06-Sept-17	
153	15	23	13-Sept-17	
193	15	29	21-Sept-17	
200	15	30	27-Sept-17	
220	15	33	04-Oct-17	
193	15	29	11-Oct-17	
187	15	28	18-Oct-17	
193	15	29	25-Oct-17	
147	15	22	02-Nov-17	
87	15	13	09-Nov-17	
100	15	15	15-Nov-17	

RESULTS

The QI project at Deder General Hospital, aimed to increase elective surgery productivity from a baseline of 9 procedures per week to a target of 15. The project successfully implemented and tested **three sequential change ideas** between **June 2016 and November 2017**. The **first cycle** focused on **external community mobilization**, the **second** on **internal operational efficiency**, and the **third** on **diagnostic support**. Each cycle yielded significant insights, with the overall project far exceeding its original productivity goal but also uncovering deeper systemic challenges that limited further gains.

The **initial PDSA cycle** tested a **community awareness campaign** to inform the public about available elective surgery services. The objective was to determine if increased awareness would translate into higher demand and procedure volume. The results were dramatically successful, far surpassing predictions. Over an **8-week** period, **199 elective surgeries** were performed, with a **median of 30.5** procedures per week—more than double the target of 15 and significantly higher than the predicted 50% increase to 23. This revealed that the primary barrier to productivity was not a lack of patient demand but a critical lack of awareness. Consequently, the hospital adopted the community mobilization campaign as a permanent activity and planned the next cycle to manage the new, substantially higher internal demand **(Figure 3).**

The **second PDSA cycle** addressed the **internal workflow** by **dedicating one operating room (OR-2)** and **table** for **both Surgery and Gynecology elective cases**. The goal was to test if this dedicated resource would reduce scheduling conflicts and turnover time, thereby sustaining the high productivity achieved after the community outreach. The test was successful; **over 8 weeks, 192 surgeries** were completed with a median of **28.5 per week,** consistently exceeding the target. This confirmed that reorganizing resources streamlined workflow and prevented internal bottlenecks. The change was adopted as a new standard, and the team moved to the next cycle to address potential pre-operative delays, specifically in diagnostic imaging **(Figure 3)**.

The **third and final PDSA cycle** involved hiring a trained radiographer to provide faster and more reliable pre-operative imaging, with the objective of reducing surgery delays or cancellations. Initially, the results were positive, with a median of 29 procedures per week for the first four weeks. However, a sharp decline occurred in the final three weeks, pulling the overall median down. Investigation revealed that the improved imaging often identified complex conditions requiring pathological analysis—a service not available on-site. This created a new critical bottleneck, demonstrating that enhancing one part of the system (radiology) exposed the next weakest link (pathology). The **hospital adopted the radiographer** hire for improved service but learned that sustaining and further increasing productivity would require addressing the fundamental gap in pathology services, a key insight for planning future improvement cycles **(Figure 3).**

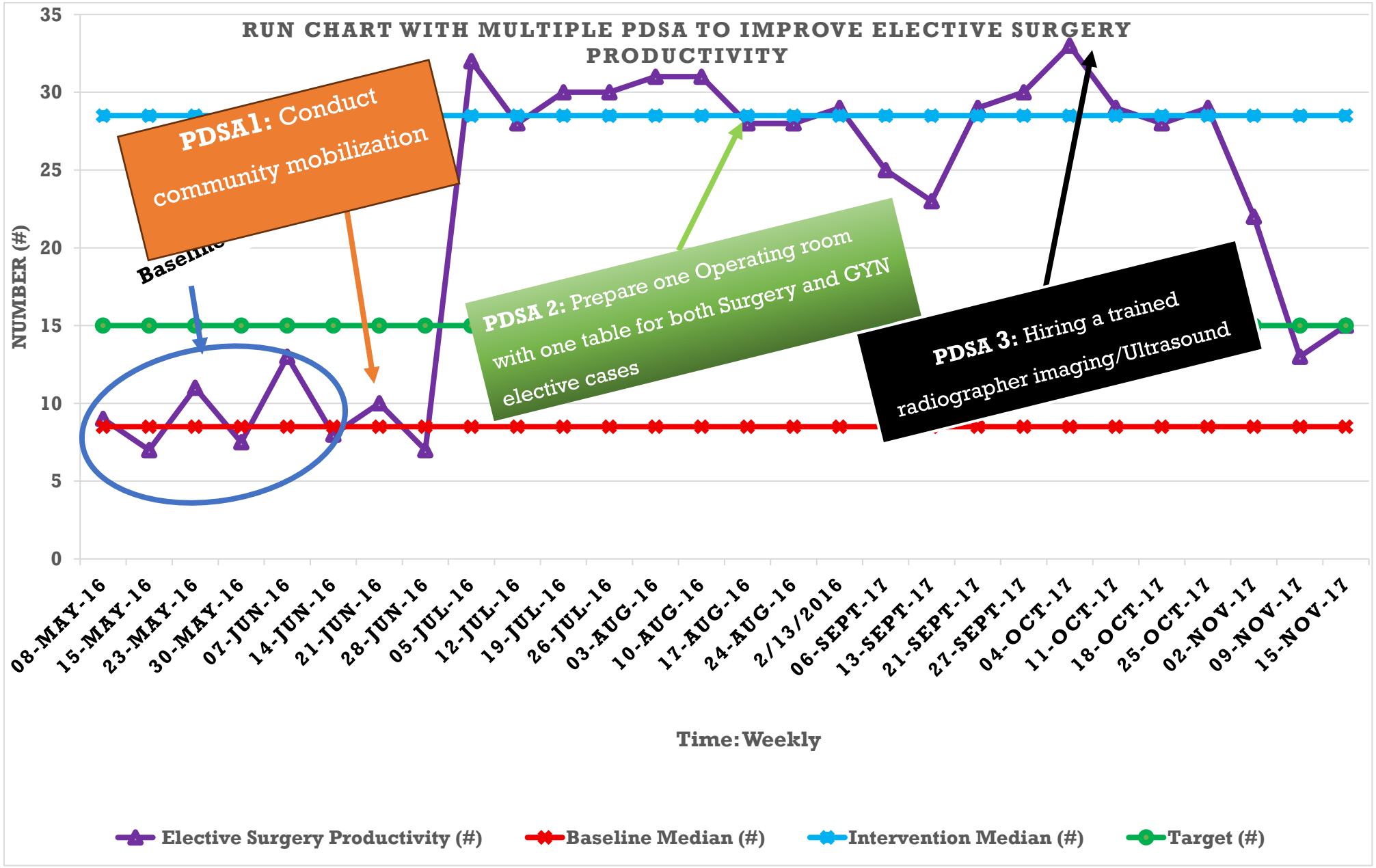

Figure 3: Run chart with multiple PDSA to improve elective surgery productivity from the current of 9 surgeries per week to 15 surgeries per week, from June 15, 2016E.C To November 15, 2017E.C.

DISCUSSION

The series of PDSA cycles illustrates a compelling journey from highly variable performance to a definitive breakthrough in elective surgery productivity. The project began with a clear and ambitious aim to increase elective surgery productivity from a baseline of 9 procedures per week to a target of 15. Firstly, the project underscores the paramount importance of correctly identifying and addressing the true root cause of a problem. The initial assumption might have been that low surgical productivity was due to internal inefficiencies or resource limitations. However, PDSA Cycle 1 brilliantly demonstrated that the primary barrier was external: a profound lack of community awareness. The staggering success of the mobilization campaign—more than doubling the target—revealed a vast, latent demand. This highlights a critical lesson for QI projects: investing resources in solutions before verifying the root cause can be ineffective. The hospital's decision to first test the demand-side hypothesis prevented them from potentially wasting effort on optimizing internal processes for a non-existent patient flow.

Secondly, the project exemplifies the iterative, system-wide nature of sustainable improvement. The success of Cycle 1 created a new challenge, which was adeptly addressed in Cycle 2. By dedicating a specific operating room for elective cases, the hospital effectively created a streamlined process to manage the new demand, preventing internal scheduling conflicts from becoming the next bottleneck. This successful adaptation shows that improvement is not a one-time fix but a continuous process of adapting the system to new levels of performance. Each cycle built upon the learning of the previous one, creating a compounding positive effect, at least initially.

However, the third cycle provides a crucial discussion point on the law of unintended consequences and the concept of the "next weakest link" in a system. The hiring of a radiographer was a logical step to eliminate pre-operative delays. Ironically, its success in improving diagnostics became its failure in sustaining productivity. By providing clearer and more readily available imaging, the radiographer uncovered more complex cases that required pathological services, a capability the system lacked. This caused a significant drop in productivity, demonstrating that optimizing one part of a complex system can shift the bottleneck to another. This is a classic systems thinking outcome; the components of a system are interconnected, and a change in one area can have unexpected effects elsewhere. The cycle was not a failure but a powerful learning experience that identified the next critical barrier to further improvement.

Finally, the project highlights the importance of a learning culture and adaptive leadership in QI. The team did not treat the decline in Cycle 3 as a failure but as valuable data. They learned that their system's capacity was now limited by a lack of pathology services, a insight that would have remained hidden without this test. The decision to "adopt" the radiographer while "adapting" the next plan to address pathology shows a mature understanding of the PDSA process: the goal is not just to implement changes but to learn and inform the next best step. This adaptive approach, guided by data and willing to confront unexpected results, is essential for navigating complex healthcare systems and achieving long-term, sustainable improvement.

LESSONS LEARNT

- **Leadership and Multidisciplinary Team Engagement Are Critical**

  The active involvement of hospital leadership (CEO, Medical Director) and a diverse QI team—including clinicians, nurses, administrators, and quality officers—was essential for driving change, securing resources, and sustaining momentum.

- **Data-Driven Decision-Making Leads to Success**

  Regular tracking of process and outcome indicators (e.g., weekly surgery rates, ultrasound turnaround times) allowed the team to monitor progress, identify bottlenecks, and adapt strategies in real time.

- **Systemic Problems Require Systemic Solutions**

  The root causes of low productivity were multifaceted (e.g., diagnostic delays, shared operating rooms, low community awareness). Addressing these through multiple coordinated interventions—rather than isolated fixes—was key to success.

- **Community Engagement Can Drive Demand and Trust**

  Raising awareness about elective surgery conditions and benefits helped reduce cultural barriers, increase early presentation, and build community trust in hospital services.

- **Dedicated Resources Improve Efficiency**

  Allocating a specific operating room for elective surgeries reduced conflicts with emergency cases and improved scheduling reliability, leading to higher throughput.

MESSAGES FOR OTHERS

1. To Hospital Leaders and Administrators:

- "Invest in Your Team and Trust the Process." This project succeeded because leadership was actively involved, not just approving. Empower a multidisciplinary QI team, provide them with resources and authority, and champion their efforts. The return on investment in terms of improved efficiency, patient satisfaction, and resource utilization is profound.

2. To Quality Improvement Teams:

"Start with Data, but Solve the System." Don't just treat symptoms. Use tools like the fishbone diagram to find the true root causes. Our biggest gains came from fixing systemic bottlenecks outside the operating room—like diagnostic delays and community awareness—not just trying to schedule faster.

3. To Clinicians and Staff:

"Your Insights Are Invaluable. Speak Up." The frontline staff knows the problems and often the solutions. This project was built on the collective knowledge of surgeons, nurses, and technicians. Your daily experiences are the most critical data for driving meaningful change.

4. To Hospitals Facing Resource Constraints:

"Innovation Trumps Limitation." You don't always need more of everything. We achieved our goal by creatively maximizing what we had (dedicating one existing OR) and strategically outsourcing what we lacked (pathology services). Look for smart partnerships and internal re-organization before assuming more resources are the only answer.

CONCLUSION

The quality improvement initiative at Deder General Hospital stands as a powerful testament to the effectiveness of the PDSA methodology in driving meaningful and transformative change. The project conclusively achieved its primary objective, far exceeding the target of 15 elective surgeries per week and demonstrating that strategic, evidence-based interventions can dramatically improve healthcare delivery. The journey from a baseline of 9 procedures to a sustained median of over 28 procedures per week underscores the profound impact of addressing the correct root cause—community awareness—and then systematically reinforcing the system to handle the new demand.

However, the true success of this project extends beyond the impressive numerical gains. The most valuable outcome was the deep, system-level learning it generated. Each cycle, including the third one where productivity declined, served as a critical diagnostic tool, revealing the interconnected nature of healthcare bottlenecks. The project evolved from a simple goal of increasing numbers to a sophisticated understanding of the hospital's entire surgical ecosystem, ultimately identifying the absence of pathology services as the fundamental constraint limiting further growth.

In conclusion, the initiative highlights that sustainable improvement is not a linear path but an iterative cycle of learning, adaptation, and resilience. The hospital's willingness to learn from both success and unexpected challenges exemplifies a mature quality improvement culture. The lessons learned—to validate root causes, expect new bottlenecks, and value all data as learning—provide a robust framework for future efforts. Ultimately, Deder General Hospital has not only improved its surgical productivity but has also built a stronger foundation for continuous learning and long-term systemic enhancement.

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