**Addressing First-Case Operating Room Delays in Academic Hospitals: Causes and Solutions**

**Introduction**

First-case delays in the operating room (OR) are a widespread efficiency problem in academic hospitals. These delays occur when the day’s first scheduled surgery does not start at its allotted time, causing a **cascading effect** on subsequent cases. Even a minor delay can snowball into **overtime costs, staff stress, and patient dissatisfaction** . OR time is extremely expensive – studies estimate each OR minute costs anywhere from **$22 to $150 per minute** . Thus, chronic first-case tardiness can translate into **hundreds of thousands or even millions of dollars in lost revenue or added expense annually** . High-performing hospitals recognize first-case on-time start (FCOT) rate as a key metric, striving for **at least ~85–90% on-time starts** . Achieving this level is crucial not only for financial reasons but also to improve OR throughput and maintain morale – when the first case “goes off late,” it leads to **frustrated providers, rushed staff trying to catch up, and unhappy patients** who experience longer waits . In the sections below, we examine the root causes of first-case delays and present evidence-based best practices and interventions to eliminate these delays across surgical services in academic medical centers.

**Common Root Causes of First-Case Delays**

Multiple studies have analyzed why first surgeries of the day start late. The causes are often **multifactorial**, involving surgeons, anesthesia providers, nursing staff, patients, and scheduling processes. A breakdown of the **common root cause categories** includes:

* **Surgeon-Related Delays:** The **surgeon’s late arrival** (to the hospital or OR) or unavailability at start time is repeatedly cited as the leading cause of first-case delays . Surgeons might be delayed by morning rounds, clinic duties, or simply tardiness. In a large multicenter study, surgeon factors were responsible for a significant portion of delays – combined with patient issues they made up about 50% of all delay causes . Many reports find **surgeon tardiness alone accounts for roughly half of first-case delays** . For example, one analysis of 5,598 first cases found that physician-related reasons (mostly surgeon late arrival or slow pre-op) caused **52% of documented delays** . Clearly, if the surgeon is not present and ready, the case cannot begin on time.
* **Anesthesiology Delays:** Anesthesia team issues are another contributor. This can include the **anesthesiologist arriving late** or not starting the patient’s anesthetic in time. It may also involve delays from performing anesthesia procedures (e.g. regional nerve blocks or invasive monitoring) **without allocating extra time** before the scheduled start . In some cases, a single anesthesia provider might be covering multiple rooms and can’t initiate all first cases promptly. While anesthesia-related delays are generally a smaller fraction than surgeon delays, they are not negligible – studies have found anesthesia issues accounting for about **7–15% of first-case delays** on average . Ensuring the anesthesia team is adequately staffed and ready (including completing the pre-op assessment and any pre-induction tasks) is essential.
* **Preoperative Nursing/Process Issues:** A variety of **pre-op process breakdowns** can prevent an on-time start. Common examples are incomplete paperwork or orders (missing surgical consent, H&P, or incorrect pre-op orders), delays in obtaining last-minute lab results, or difficulties placing IV lines and obtaining vital signs . **Pre-op nursing staff shortages or workflow inefficiencies** can slow down patient preparation . If the patient is not fully ready (IV in, vital signs taken, surgical site marked, pre-medications given) by the planned start time, the case will be delayed. One study’s fishbone analysis highlighted issues such as **missing/inaccurate pre-op orders, difficulty getting pre-op vitals, and inadequate pre-op staffing** as contributing factors . In academic hospitals, there may be additional pre-op steps such as the surgical resident’s evaluation or teaching that prolongs this phase. All these factors fall under **preoperative process delays**, which in some analyses were the second-largest cause category (e.g. ~18% of delays in one report) .
* **Operating Room Setup and Equipment Readiness:** The OR itself must be ready with all necessary equipment and supplies for the first case. **Room-related delays** include cases where the OR is not fully set up on time, needed instruments or implants are missing, or equipment malfunctions occur at the last minute . For example, if a special implant or vendor-provided tray is needed and hasn’t been sterilized or delivered in time, the case cannot start. In one Pareto analysis, **missing or malfunctioning equipment** was identified as a significant contributor to first-case delays . These issues often stem from suboptimal coordination with sterile processing or vendors, or not preparing the OR the day before. Room setup problems accounted for about 13% of delays in an orthopedic department’s audit . Ensuring the **OR is “set to go”** (correct instruments, implants, and supplies present and functioning) is critical for an on-time first incision.
* **Patient-Related Factors:** Occasionally, the **patient themselves is the source of delay**. This can happen if a patient **arrives late** to the hospital or pre-op unit, or has not adhered to pre-op instructions (for instance, eating when they were supposed to be NPO, leading to case postponement). Patient medical issues can also cause morning-of delays – for example, discovering a patient has uncontrolled high blood pressure, fever, or needs an urgent dialysis before surgery. In pediatric settings, **severe separation anxiety** or behavior issues might slow the pre-op process. Even something as simple as the patient needing to use the restroom right before going back can delay the start if not anticipated (this was identified as a recurring issue by one hospital’s data analysis) . Patient-related causes are usually a **smaller percentage (5–15%)** of first-case delays , but they are important to consider. Notably, if the patient is absent or unready, no amount of staff preparedness can compensate – the case will wait.
* **Scheduling and Administrative Issues:** The way cases and providers are scheduled can also lead to first-case delays. **Scheduling errors or conflicts** – such as booking the surgeon in two places at once, or assigning an anesthesiologist to multiple first-case inductions simultaneously – will inevitably cause a delay. Poor scheduling might also mean overly optimistic timing (not accounting for a complex setup or a patient’s special needs). **Miscommunication of start times** or changes can play a role; for example, if a surgeon was told their case starts at 7:30 but the schedule had 7:15, or if a last-minute add-on or emergency bumps the first case without clear notice. Some institutions have “grace periods” that inadvertently encourage starting a few minutes late. In summary, **coordination breakdowns** in scheduling and communication can set the stage for a late start. One study explicitly noted **OR scheduling errors** as a contributing factor in first-case delays . These issues underscore the need for tight coordination and clear communication from scheduling staff to all frontline teams about the next day’s first-case requirements.

It is evident that first-case punctuality depends on **every part of the perioperative chain functioning smoothly and on time** – the patient ready, the nurses and anesthesiologist finished with preparation, the surgeon present, and the room fully equipped. In academic hospitals, this chain is even more complex due to teaching activities and larger teams. For instance, involving surgical trainees can add extra steps (and time) to pre-op assessments or room setup, and multiple learners need to be coordinated. A recent study suggested that delays in first-case start times could even be used as a **metric of a teaching hospital’s efficiency and resident competency in perioperative care** . Overall, analyses across institutions consistently show **surgeon-related and preoperative process issues as the top causes** of first-case delays, often representing the majority of delay events . An important preliminary step for any hospital trying to fix first-case delays is to **collect data on these causes** (e.g. via delay codes or staff surveys) and perform a root cause analysis (such as an Ishikawa **fishbone diagram**) to visualize all contributing factors . This helps target the most prevalent problems.

**Impact of First-Case Delays and Benchmark Metrics**

Delays in first-case start times have both **operational and human impacts**. Operationally, as noted, they reduce OR utilization and throughput. A late first start often means at least one later case will run late as well, potentially leading to **cases spilling past regular hours or even cancellations** if the backlog grows. One source describes this as a domino effect resulting in **subsequent case delays, staff overtime pay, and patient dissatisfaction** . Staff may miss breaks or have to stay late, increasing burnout. Patients scheduled later in the day experience longer wait times and sometimes might have their surgeries bumped to another day if the delays accumulate too much. It’s no surprise that **prolonged waiting** due to OR delays correlates with **lower patient satisfaction** scores . In one study, patients who waited over 30 minutes longer than expected for care were significantly more likely to be dissatisfied with the hospital experience .

Financially, first-case delays are costly. Each minute of OR time not used as scheduled is essentially wasted overhead. Plante Moran consultants give an example: a hospital with a 10-room OR suite running 15 minutes late on average for first cases and a 50% on-time start rate could save **$1.56 million per year** by improving to a 90% on-time rate (assuming ~$100 cost per OR minute) . Another analysis estimated that consistently late first starts can cost a single large hospital around **$800,000 per year in lost productivity** (when accounting for downstream effects) . A 2020 academic study quantified their delay burden: out of 3,604 first cases, **55% were delayed (median delay 12 minutes), resulting in 631 hours of lost OR time valued at $311,966** in cost . These figures show that there is a substantial economic incentive to improve this metric.

In terms of performance benchmarking, data from the OR Benchmarks Collaborative (ORBC) and other studies provide reference points. An analysis of many hospitals reported a median first-case on-time start rate around **65%** (meaning nearly one in three first cases is delayed) . However, top-performing institutions (90th percentile) achieved **~88–90%** on-time starts . Many academic medical centers historically struggled with this metric – baseline on-time rates below 50% have been documented in some cases . For example, John Muir Health (a large health system) found that only **10–20%** of its first cases were starting on time before improvements . Similarly, a pediatric hospital in Toronto had an abysmal **6% on-time start rate** before making changes . These low baseline numbers are not outliers; surveys of various teaching hospitals have reported baseline first-case on-time percentages ranging from single digits up to 60% . The good news is that with focused efforts, dramatic improvement is possible (as we will see in case studies below). Given that **90% on-time** is considered an industry best-practice goal , any academic hospital significantly below that has an opportunity to improve efficiency, add surgical volume, and reduce costs by tackling first-case delays. Moreover, intangible benefits of improvement include **higher staff satisfaction** (less morning chaos and overtime) and **better patient experience**, as on-time starts demonstrate respect for patients’ time and reduce anxiety from waiting .

**Case Studies: Improvements and Outcomes at Peer Academic Centers**

Many hospitals – especially academic and tertiary centers – have undertaken quality improvement projects to boost their first-case start timeliness. Below are several real-world case studies and benchmarks illustrating causes, interventions, and outcomes. These examples demonstrate that a **multidisciplinary, data-driven approach** can yield significant improvements in first-case start performance.

**Table 1: Selected First-Case Delay Improvement Initiatives and Outcomes**

| **Institution (Year)** | **Key Interventions Implemented** | **Outcome: First-Case On-Time Performance** |
| --- | --- | --- |
| **Yale New Haven Children’s Hospital** (2018–2019) – *Pediatric academic hospital* | Six Sigma DMAIC project with **multidisciplinary team**. Introduced a dedicated pre-op **“first-case facilitator” nurse**, **OR setup the night before** (enforced by manager), **strategic staggering** of start times (5 rooms at 7:30, 2 rooms at 7:45 to allow extra prep for complex cases) , and small **incentives** (“Wow Bucks” $2 cafeteria vouchers) given to the entire first-case team for on-time starts . Also added an automated **text message reminder** to surgeons the day prior with their first-case time and OR number , and fixed process issues (e.g. replaced low-battery computers, introduced rapid in-house pregnancy tests to avoid lab delays) . | **On-time start rate improved from 62% to 77%** over ~1 year . Total first-case delay minutes per week dropped ~33% (from 198 to 133 minutes) . Estimated **cost savings** ~$4,000 per week in freed OR time . Improvement was sustained for 41 weeks . |
| **Toronto “SickKids” Hospital** (2010) – *Pediatric academic hospital* | Formed a multidisciplinary **task force** to analyze delays. Added **extra nursing staff in pre-op** to handle first-case preparations. Implemented a **mandatory morning huddle** for surgeons, anesthesiologists, and staff to improve communication and ensure everyone arrived by a set time . Strictly enforced arrival time policies (though this faced some pushback from physicians) . | **On-time starts increased from 6% to 60%** within 9 months . This 10-fold improvement dramatically reduced downstream delays. (Some physicians resented the strict huddle requirement, but it proved effective .) |
| **MetroHealth (Case Western Reserve)** (2017) – *Urban academic medical center* | Introduced a surgeon **performance incentive**: attending surgeons achieving >90% first-case punctuality over a year earned a **$1,000–$2,000 bonus** . Also instituted a structured **pre-OR brief (“time-out”)** in the morning to ensure readiness . Peer pressure and competition were leveraged by informing surgeons of this goal. | Over ~7 years, the hospital saw a **57% improvement in on-time start rate** and saved an estimated **$751,120** due to increased OR efficiency . (This study highlights that meaningful financial incentives can change surgeon behavior and improve metrics significantly.) |
| **John Muir Health** (2019–2021) – *Large community health system* | Deployed a **real-time analytics dashboard** (using a Surgical Services software platform) to track first-case start data and reasons for delays . Made delay data **visible and timely** (previously, OR metrics were 3–6 months old) . Engaged stakeholders via data: leadership **educated surgeons and nurses** about the impact of delays, standardized a short list of meaningful delay codes, and shared performance reports. Conducted **daily afternoon huddles** to review any first-case delays from that morning and to proactively adjust for the next day . Identified specific process fixes: e.g., ensuring ICU patients get to pre-op on time (pre-op team took ownership of ICU transports) , adjusting pharmacy delivery times for chemo drugs (pharmacy staff began delivering earlier) , planning for first-case nerve blocks with staffing adjustments , having patients use the restroom 30 minutes pre-op , and having night shift staff pre-stage ORs for big cases . Also instituted **surgeon-specific performance letters** (later departmental transparency) to foster accountability . | **Tripled the percentage of first cases starting on time** (improved from ~10–20% on-time to roughly 45–60%, based on reports). This greatly **reduced patient wait times** and improved patient experience . The culture shifted to one where data is used in real-time for continuous improvement, and staff take ownership of solving delay causes . |

These case studies illustrate several key points. First, **substantial improvement is achievable** – e.g. moving from 6% to 60%, or doubling and tripling on-time start rates – but it requires a concerted effort and often multiple concurrent interventions. Second, successful initiatives are *multidisciplinary* (involving surgeons, anesthesiology, nursing, admins, etc.) and use data to identify specific local bottlenecks. Third, different hospitals have tackled the problem with a range of tactics: from **Lean Six Sigma methods and process changes** (Yale) to **policy and incentive changes** (MetroHealth’s bonuses), to **technology-driven solutions** (John Muir’s dashboard) or **daily huddle routines** (Toronto, John Muir). Many have combined these approaches. Finally, when first-case on-time performance improves, the benefits are tangible: freed-up OR time that can be used for additional cases (improving access and revenue), less overtime (cost savings), and better morale among staff and surgeons. For instance, Yale’s project saved about 65 minutes of delays per week, which they translated to ~$4k weekly savings , and MetroHealth’s long-term effort yielded three-quarters of a million dollars in savings . Achieving high first-case reliability also means surgeons and staff can plan their day more predictably, and patients get timelier care.

Having reviewed what causes first-case delays and seen examples of improvements, we can distill the **best practices and interventions** that have proven effective. These can be broadly divided into **process-based interventions** (often using Lean/Six Sigma or other quality improvement frameworks) and **technology-driven interventions** (leveraging data analytics or automation). In practice, the best results often come from a combination of both, tailored to an institution’s specific issues. Below we detail these strategies.

**Process-Based Interventions and Best Practices**

Process-based interventions focus on improving workflows, communication, and the overall efficiency of preoperative procedures. Many hospitals use **Lean Six Sigma methodologies** to guide these efforts – for example, employing the DMAIC (Define, Measure, Analyze, Improve, Control) framework to systematically tackle first-case delays . Key process improvements and best practices include:

* **Multidisciplinary Team Huddles and Planning:** One of the simplest and most powerful process changes is implementing a **daily OR planning huddle** (often in the afternoon) involving all key stakeholders. During this brief meeting (15 minutes or so), the team reviews what caused any delays in today’s first cases and then looks at **tomorrow’s first-case lineup** to anticipate and address potential issues . For example, if a case for tomorrow has a special instrument or the patient has a known issue, the huddle ensures everyone is aware and a plan is in place. The goal is to adjust the next day’s schedule or preparations *beforehand* so that each first case is “clean and ready to go” . A “clean” first case means **all prerequisites are met**: required medical clearances done, pre-admission testing results available, anesthesia plan reviewed, surgeon’s preference card/instruments ready, any vendor implant trays on site and sterilized, and any safety concerns addressed . Many hospitals have found these huddles invaluable – they create accountability (since delays are discussed openly) and proactive planning for patient readiness and equipment. Plante Moran recommends ensuring **all stakeholders (surgeon or their office, anesthesia rep, OR charge nurse, pre-op charge nurse, scheduler, etc.) attend the huddle** consistently . Hospitals like John Muir and Toronto (above) used daily huddles to great effect, enabling dynamic adjustments (such as swapping order of cases or arranging extra resources) to prevent next-day delays .
* **Preoperative “Golden Patient” and Enhanced Preparation:** A concept termed the **“golden patient”** has emerged as a best practice: identify each OR’s first-case patient for the next day and ensure this patient is **completely optimized and ready in advance** . This means all consults or clearances are done prior to day of surgery, the patient is pre-admitted or arrives extra-early, and nothing (labs, paperwork, etc.) is outstanding in the morning. A 2018 integrative review found that this golden patient strategy – essentially having the first patient fully prepared and seen by anesthesia ahead of time – was one of the most effective interventions across studies . Tactically, this might involve a pre-anesthesia clinic visit days before surgery, or at minimum a phone call checklist the day prior to verify the patient has followed instructions and will be on time. Some hospitals assign responsibility to a specific person (e.g. a pre-op clinic nurse or a “first-case coordinator”) to **call patients the night before** to confirm arrival time and to check they have their documents, have fasted, etc. Ensuring the patient physically arrives at the hospital well before the scheduled start (and prioritizing that patient’s intake) is critical. John Muir Health’s team, for instance, had pre-op staff take ownership of transporting **first-case inpatients (e.g. ICU patients) to the OR on time** rather than assuming the busy ward staff would do it . The emphasis here is to **remove any patient-related impediments** by thorough advance preparation.
* **Streamlining Preoperative Workflows:** Many delays stem from pre-op nursing processes (starting IVs, getting vitals, finalizing paperwork). Interventions to streamline these can make a big difference. One approach is to **increase staffing or dedicate roles specifically for first-case preparation**. For example, Yale introduced a **pre-op facilitator nurse** for the first 30 minutes of the day to help push through any bottlenecks . Toronto added extra pre-op unit staff to handle first-case patients . If hiring new staff is not feasible, cross-training and reallocating existing staff during that critical 6–7am period can ensure tasks don’t bottleneck. Another tactic is to **complete as much setup as possible the day prior**: Yale’s project had OR nurses set up the room the evening before (which was not consistently done earlier) – this saved precious minutes in the morning. Similarly, John Muir’s OR **night shift now pre-sets large case equipment** so the morning staff are not scrambling . Standardizing a **comprehensive pre-op checklist** is also key – borrowing from AORN guidelines, many hospitals implement robust checklists that cover all necessary prep items (IV started, antibiotics ready, site marked, labs checked, consent on chart, etc.) and require each to be ticked off well before the OR start time . Some use visual management tools: Yale placed a **whiteboard in pre-op** listing the first-case patients and statuses so everyone could see progress . Ultimately, tightening pre-op processes often means **starting earlier** – e.g., if cases start at 7:30, having patients in pre-op by 6:30 and staff assignments such that all first-case tasks are done by 7:15.
* **Enforcing Start-Time Discipline and Accountability:** Culturally, it’s important to establish that the first-case start time is a **hard start** for everyone – not a target that can slip. Some hospitals have implemented policies like requiring all surgeons to be in the hospital by a certain time (e.g. 7:00 for a 7:30 start) or even using time clocks/badge scans to monitor arrivals. The **morning huddle** approach (as done in Toronto) effectively enforced surgeon and anesthesiologist presence by a deadline . Another strategy is peer accountability: John Muir’s medical director personally engaged with surgeons who had frequent delays, using **peer-to-peer conversations** to encourage punctuality . Later, they mailed out **surgeon-specific scorecards** and eventually a departmental letter ranking everyone – making the data transparent created a peer pressure to improve. Some institutions have even considered a **two-schedule system** – an “official” start time and an earlier “internal” start time communicated to chronically late individuals to trick them into showing up earlier (though this is a tongue-in-cheek approach and not formal best practice).
* **Financial or Recognition Incentives:** As shown in the MetroHealth case, financial incentives can be potent. Tying a portion of surgeon (or anesthesia provider) compensation to first-case timeliness can motivate behavior change . Performance bonuses (e.g. a yearly bonus for achieving >90% on-time starts) send a clear message that the institution prioritizes this metric . However, large bonuses require administrative buy-in and funding, which may be challenging. Smaller, symbolic rewards have also been used – Yale’s “Wow Bucks” vouchers given to each team member for on-time first cases is an example of a **non-monetary incentive** that still generated excitement and friendly competition . Recognizing and celebrating teams that achieve a stretch of on-time starts (for instance, an email congratulating the Monday OR team for 5 of 5 on-time first cases) can boost morale. Conversely, consistently late individuals may face **gentle repercussions** like a conversation with the department chair or being asked to explain delays at QA meetings. The key is to create a culture where timeliness is expected and valued, through either carrots (incentives) or sticks (accountability). As one study noted, strategies aimed at surgeon preparedness – whether via **better communication or financial incentives** – are often the most impactful, since surgeon delay is a major lever to improve overall performance .
* **Optimizing Scheduling and Case Assignments:** Process improvement also extends to how cases are scheduled. One best practice is **staggering first-case start times** when resources (like anesthesia teams) are limited. Yale moved two of seven ORs to start 15 minutes later (7:45 instead of 7:30) specifically for complex cases needing more prep time . This staggering ensured that the anesthesia team could induce the first wave of cases, then turn to those two slower-start rooms, avoiding simultaneous overload. Another scheduling tactic is to preferentially schedule “simple” cases or those with minimal setup as first cases if certain surgeons or situations tend to run late. Some centers also avoid assigning certain combinations – for instance, if one surgeon is known to often run behind, they might not get the 7:30 Monday slot unless they improve their record. **Block scheduling adjustments** can be made based on data: John Muir’s team identified opportunities to adjust block times after improving first-case starts, to better align scheduled cases with actual durations . In essence, continuously refine scheduling templates using the insights from performance data. Lastly, **communication of the final schedule** is critical – everyone (surgeon, anesthesia, nursing, transport) should know the exact first-case start time and location, ideally confirmed the day prior, so that there are no surprises in the morning.
* **Utilizing Lean Tools for Root Cause Analysis:** Many hospitals have used Lean/Six Sigma tools to dissect their first-case delays and guide interventions. For example, Ishikawa **fishbone diagrams** help teams brainstorm and categorize causes (people, methods, machines, materials, etc.) . This ensures lesser-thought-of causes (like a faulty printer delaying paperwork, or a stretcher shortage) are not overlooked. **Pareto charts** are used to identify the most frequent delay reasons – focusing improvement efforts on the “vital few” causes that account for the bulk of delays . By applying the Pareto principle, one can prioritize interventions (e.g. if 50% of delays are surgeon late, then surgeon-focused solutions will yield the biggest gains ). Plan-Do-Study-Act (**PDSA cycles**) allow iterative testing of interventions on a small scale before broader implementation . For instance, trialing a new morning checklist in one OR for a week to work out kinks, then expanding it. The DMAIC process used at Yale started with Define/Measure (collect baseline data on how often and why delays occur), Analyze (identify key drivers like patient readiness, paperwork, etc.  ), then Improve (roll out changes) and Control (monitor sustainment) . This structured approach ensures changes are data-driven and effective. Lean methodology also encourages engaging frontline staff in coming up with solutions since they often know the process gaps best – Yale, for example, surveyed all OR personnel for ideas and got 86 responses that informed their intervention design .

In summary, process-based solutions for first-case delays revolve around **ensuring readiness**: the right people in the right place at the right time with the right equipment. Core themes are **better communication (huddles, checklists), better preparation (the day before and early on day-of), and instilling a culture of timeliness and accountability**. By focusing on the major delay drivers (often surgeon punctuality and pre-op processes ) and using quality improvement tools, hospitals have seen significant gains. It’s important to note that **one size does not fit all** – as Halim et al. observed in a review, each institution should tailor interventions to its specific delay causes . For example, if missing lab results are a big issue at Hospital A, the fix might be deploying point-of-care testing in pre-op (like the rapid pregnancy test Yale did) ; whereas another hospital might have no lab issues but big staffing issues, requiring a role or schedule change. The above best practices serve as a menu that can be selected from based on the root cause analysis.

**Technology-Driven Interventions and Innovations**

Technology and data analytics can play a pivotal role in reducing first-case delays by **improving information flow, providing real-time feedback, and enabling proactive adjustments**. Several cutting-edge or widely adopted tech-driven strategies include:

* **Real-Time OR Performance Dashboards:** Implementing a **data dashboard for perioperative metrics** allows instant visibility into first-case start performance and its impediments. Traditionally, OR metrics were compiled manually and reviewed weeks or months later, which is not useful for immediate improvement . Modern analytics platforms (like the Health Catalyst system used at John Muir or built-in hospital EMR dashboards such as Epic’s OR Manager) can display up-to-the-minute status of each first-case. These dashboards often consolidate data such as patient in-room times, delay reasons entered by staff, and whether each item on the pre-op checklist is completed. At John Muir Health, leadership used a Surgical Services analytics application to **“slice and dice” delay data and identify outliers** . For example, they could quickly see which surgeon or service had the most delays or what the top delay reasons were on a given day. They then socialized this data with staff to validate accuracy and ensure delay codes were used consistently . Making data **timely and transparent** helps shift the culture – staff and surgeons begin to see quantifiable feedback on their performance and can no longer assume delays go unnoticed. Dashboards also support those daily huddles: many teams **display the dashboard or print a daily report for the huddle**, so they can review today’s performance and yesterday’s issues with concrete numbers . The John Muir case credits the readily accessible data as a key enabler that created “a culture where leaders and staff are using data to drive continuous improvement” . In short, **data democratization** through dashboards ensures everyone knows where things stand and can focus on problem-solving rather than data-gathering.
* **Electronic Readiness Boards:** Similar to dashboards, some hospitals have developed **electronic OR readiness boards** that track the status of each element required for a first-case start. For instance, an electronic board might show columns for “Patient in pre-op,” “Surgeon in hospital,” “Anesthesia ready,” “Nursing ready,” “Equipment ready” with green/red indicators. A 2024 quality improvement project by Knox et al. described using an **Electronic Readiness Dashboard** to improve first-case on-time starts . Such a system allows the OR control desk and all team members to see in real time if something is not ready – for example, if by T–15 minutes the surgeon’s indicator is still red (not checked in), someone can page the surgeon. These boards basically function like a digital checklist visible to all. The study by Knox et al. reported that using an electronic readiness dashboard and addressing the gaps it highlighted led to a significant reduction in delays (they noted tens of thousands of delay minutes eliminated) . The transparency of a readiness board also fosters accountability – no one wants to be the only red light holding up an otherwise green board. Many EMRs allow some customization to create such tracking tools, or hospitals use a simple shared spreadsheet that is updated by pre-op staff.
* **Automated Notifications and Reminders:** Automation can nudge human behavior in subtle but effective ways. Several hospitals have implemented **automated text or pager reminders** to ensure key players are on time. For example, Yale started sending all surgeons a text message at 5:00 PM the evening before surgery, listing their first-case start time, the OR number, and a contact for any questions . The idea is to put the schedule top-of-mind and give surgeons a chance to resolve any issues (like if they realize they’re double-booked or have a concern, they can address it the night before rather than it causing morning chaos) . Some places also send a reminder early morning (“Your case starts in 1 hour”) especially to surgeons who opt-in. Anesthesiology departments often have an automated system to **notify the on-call team of first-case assignments** and any special requirements. Beyond personnel, automated reminders to patients are useful too – for instance, an automated call or text to the patient the day before reminding them when to arrive and to bring their CPAP or stop blood thinners, etc. Ensuring the patient gets these reminders can prevent no-shows or preparedness issues. These low-cost IT interventions can complement the human processes: think of it as a safety net making sure nothing (and no one) is forgotten.
* **Predictive Scheduling and AI:** A more advanced frontier is using **predictive analytics and artificial intelligence** to optimize OR schedules and reduce delays. One aspect is **better prediction of case durations** – if the first case is scheduled for an unrealistically short duration, the team might not even plan to have the patient in the room by the official start time, or the anesthesiologist might not arrive early enough, thinking there’s extra slack. Machine learning models have shown ability to improve surgical time estimates significantly . In a 2021 randomized trial at Memorial Sloan Kettering, a predictive model improved case length accuracy and notably **reduced patient wait times** for surgery . More accurate scheduling means the first-case start time is set appropriately and resources are marshaled at the right times, avoiding idle gaps or unrealistic rushes. Another application is **predictive modeling of tardiness** – using historical data to identify patterns (e.g., surgeon A is often 10 min late on Mondays, or cases in Room 5 tend to start late when a certain tech is assigned) and then adjusting the schedule or sending targeted alerts. Some systems might eventually predict the likelihood of a first-case delay each day and warn the team in advance to take action (though this is still an emerging area). Additionally, **electronic scheduling systems** can enforce rules like preventing overlapping bookings or flagging if a surgeon has more than one first-case on a given day at different sites, thus averting scheduling-induced delays.
* **Electronic Checklists and Documentation:** Moving away from paper-based pre-op checklists to **electronic checklists integrated in the EHR** can ensure that nothing is missed and that managers have oversight. If an item is not completed, the system can trigger an alert. For example, an electronic checklist might require that the pre-op nurse enters confirmation that the consent is signed and in the chart – if not done by T–30 minutes, a notification could go to the charge nurse to intervene. Similarly, having the anesthesiologist sign off their pre-anesthesia evaluation in the EHR the day before ensures that piece is done; if it’s not done, it could page the anesthesiologist as a reminder. Many hospitals use their **electronic health record perioperative module** to monitor such tasks. The Association of periOperative Nurses (AORN) publishes a **Comprehensive Surgical Checklist** template which, when implemented electronically, covers a lot of readiness items from pre-op through sign-out. By leveraging the EHR to not just document but actively manage tasks (with timestamps and alerts), hospitals can tighten the timeline and catch delays-in-progress early.
* **Data-Driven Feedback to Staff:** Technology also enables new ways of delivering feedback and education. For instance, some institutions are experimenting with **dashboards on mobile devices** or emailed weekly reports to all surgeons comparing their first-case on-time percentage to their peers. John Muir’s approach of starting with individualized letters and moving to departmental transparency was facilitated by having the data and a way to disseminate it . In the future, one could imagine a smartphone app where surgeons see their daily schedule and a big green or red indicator if they met on-time start for the week, along with a leaderboard. Gamification elements could even be introduced (e.g., “Congratulations, you are in the top 10% for punctual starts this month!”). The technology to do this exists; it’s more a matter of organizational will and culture to implement such measures.

Overall, the role of technology in this context is to **enhance situational awareness and streamline communication**. A common theme is making the invisible visible – delay causes, real-time status, individual performance – so that problems can be addressed promptly. Importantly, while technology can provide the information and nudge, humans still have to take action on it. The best results occur when tech tools are combined with process changes. For example, having a fancy dashboard alone won’t fix delays unless leadership actively uses it in huddles and engages staff with the insights . John Muir’s success came from not just installing analytics software, but also leadership’s commitment to meet with surgeons and nurses armed with that data and to follow up daily . When deployed properly, however, technology greatly accelerates the improvement cycle – as one anesthesiology leader said about their new OR data system: “To improve operations, you need performance data that is immediately available, so you can provide people with immediate feedback” . In academic hospitals, where multiple services and large teams are involved, these tech tools can coordinate everyone and keep the focus on the shared goal of starting on time.

**Recommendations for a Multidisciplinary Team Approach**

Improving first-case start times is a **multidisciplinary challenge** that requires buy-in and action from all stakeholder groups. An isolated effort (e.g. just telling surgeons to be on time) will not succeed if other parts of the system remain broken. The following are **prioritized recommendations** for a comprehensive, team-based approach to eliminate first-case delays, drawn from the best practices and evidence discussed:

1. **Form a Dedicated Perioperative Improvement Team:** Assemble a team with representation from all key stakeholders – including surgeons (ideally a high-volume surgeon champion), anesthesiologists, OR nursing leadership, pre-op/PACU nursing, surgical techs, scheduling coordinators, and hospital administration. Ensure everyone understands the cost and impact of first-case delays to create a sense of urgency and common purpose . This team will lead the project, analyze data, and implement changes.
2. **Gather and Analyze Data on Delays:** Begin with measuring the baseline first-case on-time start rate and collecting data on delay reasons. Use the electronic medical record or a manual log to have OR staff document every first-case delay with a reason code. Consider doing staff interviews or surveys for more insight. Perform a **root cause analysis** (e.g. fishbone diagram, Pareto chart) to identify the most frequent and impactful delay causes at your institution . Also, benchmark your performance against similar institutions or published standards (if you’re far below the ~65% industry median or 90% best practice, that quantifies the improvement opportunity) .
3. **Target the Top Root Causes with Specific Solutions:** Prioritize interventions addressing the causes that account for the majority of your delays (often surgeon lateness and pre-op process issues will be top ). Develop an action plan for each major category:
   * *If surgeon tardiness is a primary cause:* Set clear expectations (e.g. all surgeons in OR or hospital by X time). Communicate that first-case start time is the **incision time**, not arrival time – meaning surgeons should be present ~30 minutes before. Enlist department chairs to reinforce this. Implement accountability measures: regular reports of each surgeon’s on-time percentage, peer review of chronic delays, and possibly link punctuality to privileges or bonus (as done with performance incentives) . Also, remove any “hidden” leniencies (no more unspoken 15-minute grace periods). If culturally feasible, consider a modest incentive or recognition for consistent timeliness to encourage buy-in.
   * *If pre-op preparation delays are common:* Ensure **patients are properly prepared and in the pipeline early**. For outpatients, confirm arrival times with automatic calls/texts and stress the importance of timeliness. For inpatients, coordinate transport and have a dedicated person ensuring the first-case patient is ready. Implement a “golden patient” protocol – the day prior, verify that the first-case patient’s work-up is complete, necessary labs are done, blood products ready if needed, and no consults pending . On the day of surgery, have pre-op nursing start early enough (perhaps bring first-case patients in 15–30 minutes before other patients). If needed, assign an extra nurse or a charge nurse exclusively to manage first-case checklists and preparation tasks for that first hour .
   * *If anesthesia-related delays occur:* Make sure a sufficient number of anesthesia providers are available early. If nerve blocks or special lines are needed, consider doing them in parallel in block rooms or allocate extra time in the schedule. At the daily huddle, flag cases with anticipated anesthesia complexity and plan staffing accordingly (John Muir’s team began doing this to ensure blocks didn’t delay cases ). Emphasize to the anesthesia team the goal of having induction start at a time such that surgery can cut at scheduled time (e.g. inducing 30 minutes prior). If pre-op anesthesia evaluations are causing delay, have them see the patient earlier (even night before for inpatients).
   * *If equipment/setup is an issue:* Institute a policy that **ORs are set up the evening before** for all first cases . The charge nurse or evening staff should ensure needed instrument sets, implants, and devices are in the room or readily available by end of day. Verify that any vendor-supplied items are on site. In the afternoon huddle, ask “Is the equipment for each first case ready?” If large complex cases are first, consider allowing those teams to clock in a bit early to set up (and pay them accordingly) . Have a backup plan for common equipment failures (e.g., if the video tower malfunctions at 7:30, have biomed on standby or a spare available). Essentially, **no surprises** in the morning – everything that can be prepared in advance should be.
   * *If scheduling or coordination is a problem:* Work closely with the scheduling office to refine processes. For example, implement checks so that a surgeon cannot schedule overlapping first cases or that any schedule changes after hours trigger notifications to all parties. Utilize a standardized electronic scheduling system that captures needed info (like special equipment or patient needs) so that these are known ahead of time. The multidisciplinary team should review first-case scheduling policies and revise unrealistic practices. Also, use the afternoon huddle to adjust schedules if something looks untenable for tomorrow – better to delay or swap cases the evening before than have an unplanned delay in the morning . Coordination improvements also include ensuring all **support services (lab, radiology, blood bank, pharmacy)** know the first-case schedule – e.g. John Muir discovered pharmacy was delivering chemo too late and fixed that by having pharmacy come earlier .
4. **Establish a Daily Multidisciplinary Huddle Routine:** As described earlier, implement a standing daily meeting (in-person or virtual) with representation from surgery, anesthesia, nursing, and ancillary departments to review that day’s first-case performance and to prep for the next day . Make attendance expected – incorporate it into people’s schedules (surgeon offices might dial in, anesthesia attendings and charge nurses attend in OR). Use a standardized agenda: review delays from the morning (and assign follow-up or discuss prevention), then go over each first case for tomorrow: is the patient cleared? any special needs? is the surgeon aware if it’s an add-on? etc. The output of each huddle is actionable: resolve any issues (e.g. arrange a patient to come early, call a vendor, notify a surgeon’s office of something) before day’s end. Ensure this is done **every business day**. These huddles create continuous feedback and rapid problem-solving loops, which numerous hospitals have credited for sustained improvements .
5. **Leverage Technology and Data:** Use the tools at your disposal to monitor progress and keep everyone informed. Configure an **OR dashboard or report** that tracks first-case start times daily. Post the **metrics publicly** – for example, yesterday’s first-case on-time percentage on a notice board or emailed to all OR staff each morning . Track not just the percentage on-time but also the reasons for delays, and share those with the team (“3 cases delayed: 1 surgeon late, 1 waiting on labs, 1 equipment issue”). If your hospital can implement an electronic readiness tracking system, do so – it will make it very clear each morning what (if anything) is holding up a start. Automate reminders: ensure surgeons and staff get notified of schedules as discussed. Additionally, employ data analytics to continuously identify patterns – for instance, if data shows Orthopedics cases have disproportionate delays , you might focus interventions there or meet with that department separately. The key recommendation is to make **data-driven decisions** and frequently review the data to guide the project. By giving all stakeholders visibility into the same facts and figures, you align the team’s efforts.
6. **Implement Changes Incrementally and Use PDSA Cycles:** When rolling out interventions, use a structured improvement approach. Pilot new processes on a small scale, gather feedback, then expand. For example, start the afternoon huddle with one surgical service, or try the text reminder system with a subset of surgeons, then refine it before wider implementation. Measure the effect of each change if possible. This iterative approach (Plan-Do-Study-Act) helps find what truly works in your setting . It’s also wise to not change too many variables at once in case something has an adverse effect. Over time, successful practices can be standardized and written into policy (the “Control” phase of DMAIC, ensuring the improvement holds) . Always keep communication open – solicit feedback from frontline staff on new procedures since they might suggest better ideas or identify issues early.
7. **Maintain Accountability and Culture Change:** Changing metrics like first-case timeliness often requires a culture shift. Hospital leadership should consistently **emphasize the importance of on-time starts** in meetings and communications. Celebrate improvements – for instance, announce when the OR achieves a new high on-time rate or goes a week with 100% on-time first starts, acknowledging the teamwork involved. At the same time, address recurring problems head-on. If one service or individual continues to lag, use the data to have a constructive discussion or intervention. Over the long term, consider incorporating first-case on-time performance into performance evaluations for surgeons, anesthesiologists, and OR managers to cement accountability. Many teams find that after an initial improvement project, **ongoing monitoring and feedback** is needed to prevent regression . Thus, keep the issue on the agenda of OR governance meetings. By making first-case timeliness part of the institutional culture (e.g. surgeons voluntarily say “Okay team, let’s aim for wheels in by 7:25!”), the changes are more likely to sustain. Remember that improved first-case starts benefit everyone – patients get timely care, surgeons avoid end-of-day overruns, nurses and anesthesiologists have less stress, and the hospital gains capacity. Reinforcing these shared wins helps unite the team.
8. **Monitor Outcomes and Iterate:** Finally, continuously monitor the results of the interventions. Watch the first-case on-time percentage trend (using run charts or control charts) to see if goals are being met and sustained. Track secondary metrics too: the average delay minutes, number of days with all on-time starts, downstream effects like reductions in last-case end time or staff overtime hours, and even staff/patient satisfaction if possible. When targets are achieved, consider **raising the bar** or tackling the next challenge (such as turnover times) – but ensure first-case gains are maintained. If certain interventions aren’t yielding improvement, regroup and try alternative strategies. Each hospital’s situation evolves (new surgeons, changes in case mix, etc.), so the team should be agile in responding to new causes that may arise. Continuous quality improvement is a cycle, not a one-time fix.

In conclusion, solving first-case OR delays requires treating it as a priority operational improvement project with strong leadership support. An academic hospital must engage all the stakeholders – surgeons, anesthesiology, nursing, schedulers – in both diagnosing the problem and implementing the solutions. By addressing the **root causes** (especially surgeon and pre-op process issues) with a combination of **process redesign (Lean methods, huddles, better prep) and technology enablers (data dashboards, reminders)**, institutions have achieved remarkable improvements in first-case start timeliness. A multidisciplinary, systematic approach, as outlined above, will not only increase the first-case on-time start rate but also enhance overall OR efficiency, staff workflow, and patient satisfaction. As demonstrated in the case studies, these efforts can pay off significantly in **higher throughput, cost savings, and a smoother start to each surgical day** – setting a positive tone that carries through the rest of the day’s schedule . The first case of the day truly “sets the pace,” and with the right strategies in place, that pace can be one of timely, well-coordinated care.

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