



The Checklist Manifesto: How to Get Things Right

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What is Ineptitude?

During my surgical training days, I read a short write-up that has stayed with me since then. The write-up was on human fallibility or how we fail to do something that we consciously decide to do. The authors of the write-up found two reasons why we fail:

1. We fail simply because we do not have the necessary knowledge, that is ignorance. In the 1950s, there was not enough knowledge about heart attacks. A doctor's ability to treat a heart attack patient was limited to putting the patient on bed rest for weeks.
2. The case of ineptitude, where the knowledge exists but we are not able to use it appropriately. Today substantial knowledge exists on the causes of heart attacks and their treatment. Making the right treatment choice among the various options available is a question of eptitude. Not applying the right knowledge, then, becomes ineptitude.

Checklist is the solution to ineptitude

Despite the tremendous level of knowledge we have gained in all facets of life including medicine, failures continue to happen. The amount of knowledge we have has now started exceeding the human capability to manage information. Errors creep in because we are not able to apply the knowledge reliably. Knowledge, in itself, is not the problem but its reliable application is. And there is a simple solution to this seemingly big problem of ineptitude and lack of reliability. **It is called a checklist.**

A study in Israel showed that patients in ICU require 178 individual actions per day. The study observed that the hospital staff made a 1% error in these actions which adds up to two errors per day per patient. In the ICU, these two errors mean the difference between life and death. The need then is to make the right diagnosis and then ensure the 178 actions on the patient are done correctly, consistently. There is enough knowledge (and super specialisation) in the medicine world to do the diagnosis correctly, **but what is required to save the patient is reliably doing the 178 actions without any errors.**

What is a Pilot's checklist?

In October 1935, the U.S. Army Air Corp conducted trials for inducting long distance bombers into the air force. Boeing's "flying fortress" Model 299 was seen as the frontrunner with its technical superiority on all key parameters. However, on that day in October 1935, the Boeing Model 299 took to the skies and then exploded in a crash! Investigations revealed that the pilot had too many controls to take care of and missed releasing a lock on the aircraft, which led to the crash. A local newspaper called it "too much airplane for one man to fly."



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The Army Air Corp went ahead with the much smaller Douglas bombers. Boeing test pilots went back to the drawing board and came up with a solution that did not require additional training or tests. They put together **a pilot's checklist** that listed key checks for takeoff, flight, landing and taxiing. The pilots flew the Model 299 for 1.8 million miles without any mishap and the U.S. Air Force later bought 13000 aircrafts and rechristened them B-17. The B-17 played a critical role in the victory of the Second World War.

Checklist in medicine

In the world of medicine, the belief is that the job is too complicated to be broken down into a simple checklist. But that's not true. **There are just four data points that indicate overall health of a patient-body temperature**, blood pressure, pulse and respiratory rate. By recording these reliably and consistently, a lot of complications can be avoided. But then human memory fails to record all these four consistently and then in a lot of cases, the overall complexity of the case makes this step “mundane and trivial” and therefore, easy to miss. Checklists bring in the reliability of attention and the discipline of consistent behaviour. Checklists act as a “cognitive net.”

In 2001, Peter Pronovost, a critical care specialist at John Hopkins Hospital, put together a short checklist for one action in the ICU. There were five simple steps in this checklist like wash your hands, wear a mask and so on. He then made sure that the hospital administration authorised nurses to stop doctors if they skipped a step on the checklist. Over a period of one year of implementation, **the infection rate went down from 11% to 0%.**

Encouraged by this, Pronovost then tested some more checklists at the John Hopkins ICU with equally successful results. However, the adoption of checklist was slow in John Hopkins partly because experienced surgeons got offended by the fact that they were being asked to follow a simple checklist, and partly because it was just one hospital.

The Keystone Initiative

In 2003, Pronovost got to test his checklist in a much more challenging environment at the Sinai-Grace Hospital in Detroit. The Sinai Grace Hospital was big and struggling with funds and overall low employee morale.

Pronovost found that the hospital had one of the highest central line infection rates of all American hospitals. He also got a small bonus sanctioned for the hospital to participate in the program.

This project, termed Keystone Initiative, led to a reduction of central line infection by 66% and over 18



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months, the Keystone Initiative helped save 1500 lives and \$ 175 million. All due to the humble checklist. **But do all situations require a checklist?**

The Three types of problems

Experts have succeeded in classifying all the problems in the world into 3 buckets!

1. Simple problems like baking a cake require basic techniques to learn and with training and recipe, chances of success are high.
2. Complicated problems are like launching a rocket. The process is not as simple as a cake recipe and requires multiple sub projects and team coordination. Once a rocket is launched, then the process is coded and repeated for other rockets.
3. Complex problems like raising a child are more difficult than launching a rocket. That's because you cannot repeat the "process" of raising your first child for your second child. The second child may be very different from the first and requires a very different "process". The outcome remains highly uncertain.

Checklist in construction industry

So do checklists work only for simple problems or across the spectrum of simple, complicated and complex problems? I found my answer in the construction industry. How do construction workers know they are constructing a building correctly? I spent some time with the structural engineer who was building our new hospital wing and got to understand the following:

Construction workers follow a construction schedule that tracks individual sub projects, their dependencies and the time taken. This schedule is almost like one long checklist.

This construction schedule is sent to sub-contractors for a double-check and using this schedule, the knowledge of hundreds of engineers and construction workers is used in the right place at the right time and in the right way.

There is one more checklist called **the submittal schedule**- this checklist did not list construction tasks like the construction schedule and instead, listed the communication tasks. The submittal schedule ensured different teams talked to each other as per a schedule with defined frequency and discussion subject. The submittal schedule combines the power of communication with the wisdom of the group.

Today these two schedules are managed using sophisticated software but in the days before the computer, there would be a **master builder** who would act as the central flow for both construction and submittal



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checklists.

The construction industry had realised long ago, and much before medicine folks, that the knowledge required to build a skyscraper exceeds any one individual's knowledge and multiple teams leads to complexity. **By having the two checklists the construction industry had tackled unpredictability and yet made room for judgement of the experts.**

Van Halen's brown M&M candy

Celebrated rock group Van Halen has an interesting clause in its contract with concert promoters-there will be bowls of M&M candies kept at the backstage **but none of the bowls will contain the brown variant of the candy.** If a brown M&M is found, Van Halen will not perform and the organisers have pay the group the full contract amount. The only way to remove brown candies from a pack of M&Ms is to manually remove them!

David Lee Roth of Van Halen explained this clause in his memoir Crazy from the Heat. He said he did this to ensure that the complexity of a Van Halen concert involving tonnes of material and heavy duty trucks does not make the concert organisers skimp corners. In one instance in Colorado, when Van Halen discovered brown candies in their M&Ms, they did a full check of the arrangements and discovered that the organisers had not complied with the weight requirements and there was a risk that the entire stage would have collapsed under its own weight.

Van Halen cancelled the concert because they found brown M&Ms and then they found serious safety risk. **Van Halen had a checklist!**

Project in Pakistan

The three features (simple, measurable, transmissible) are best captured in a public health program conducted in Pakistan with U.S. support in late 1990s. The program was aimed at reducing the high rate of premature death among children in the slums of Karachi, Pakistan. The slums suffered from inadequate sewage systems & illiteracy coupled with a corrupt bureaucracy.

A young American health worker Stephen Luby was part of the program and he decided to use the humble soap to achieve the program objective. His team, with some help from P&G, distributed soaps across the slums asking people to wash with soap in six situations daily, ranging from taking bath to before preparing and eating food. The slums were divided into test (where soaps were distributed) and control (where no soap was distributed) zones.



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The program continued for a year and the results were staggering-diarrhoea incidents dropped by 52% compared to control zones and pneumonia went down by 48%. **Luby explained the success in terms of soap being a behaviour change agent.**

Even before the study, in both the test and control zones, people were using soap. Just that they were using it infrequently and inconsistently. By providing free soap, the need to buy more soap due to more frequent washing, was taken care of. Secondly, the six situations for using soap and its communication made the use of soap more systematic. This provided the consistency and reliability that is critical for success. **Effectively, Luby had got the test zone slum dwellers follow a six point checklist on using soap!**

Checklists at the WHO

In January 2007, on a request from the World Health Organisation (WHO), I took up a project spanning all member WHO countries, aimed at reducing avoidable deaths from surgery. During our first meeting in Geneva, various approaches to reduce these avoidable deaths were discussed, including more training and incentivisation as well as publishing a manual for official standards for safe surgical care. But then there were scores of manuals lying hospitals across the world unread. **We needed something more effective and yet simple, measurable and transmissible-the three things required for effective implementation.**

The joint team at Geneva decided to test a safe surgery checklist. This checklist had three “pause points”- before anaesthesia, after anaesthesia but before incision and then at the end of the surgery before the patient is wheeled out of the operation theatre. The communications check (akin to construction industry's submittal schedule) was also incorporated.

We were all very excited to implement this checklist across the world and I decided to use it in my operating room as well. However, the checklist in my operating room did not stand up to scrutiny and led to delays in the surgery. **The checklist did not survive one operating room in America, leave alone the rest of the world.** I then decided to understand more about making checklists from the folks who had pioneered it and were using it for the past 8 decades-the aviation folks.

Checklist and aeroplanes

I met up Daniel Boorman of the Boeing Company at Seattle. Daniel showed me a 200 pages bound handbook that pilots use. Surely the checklist could not be 200 pages long? Daniel clarified that it was actually a compilation of various checklists built for a variety of flight scenarios. The normal checklist that was used for day to day flight operations was only three pages, each page having just a couple of lines in easy to read font. I learnt that good checklists are brief and precise. Bad checklists are confusing and try to



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capture so many things that they start resembling how-to-do manuals.

Aviation uses two kinds of checklists. The DO-CONFIRM checklist requires people to do their jobs and then pause and run the checklist to confirm everything required was done. The READ-DO checklist, on the other hand, is more like a recipe-you read the checklist and do things as instructed. Pilots repeatedly and consistently use checklists because they have been trained to use checklists and also because they are aware of the benefits of using checklist.

Back at the WHO

I went back to my WHO Geneva team armed with this knowledge and we decided to modify our safe surgery checklist into a DO-CONFIRM checklist. This format gave the expert surgeons enough flexibility to do things their own way and yet ensure they paused at the relevant stages to confirm what needs to be done.

In spring 2007, all the participating countries again convened in London to discuss the checklist. The final checklist had 19 actions and 3 pause points- seven points before anaesthesia, seven points before incision and five points before leaving the operating room. Armed with this, in spring 2008, the WHO program was rolled out in hospitals across eight countries in the developed, developing and under developed worlds.

The results of this WHO pilot came in October 2008. **Across the eight hospitals, surgical complications dropped by 36% and deaths due to surgery dropped by 47%.** Our detailed findings were published in January 2009 and the word caught on beyond the pilot hospitals and countries. After three months of the checklist being in place, we did a spot survey and found that 80% of the staff found the checklist quick and easy to use and 78% actually observed that the checklist had prevented an error during the surgery.

Checklist in finance

Checklists are not just about medicine, construction and aviation sectors. They are equally effective even in the esoteric world of finance. Warren Buffet apparently uses a “mental checklist” when he evaluates investment proposals. I spoke with Mohnish Pabrai, managing partner at the \$500 million Pabrai Investment Funds in California. Mohnish believes in systematic investigation before deciding to invest and unlike Warren Buffet, he has a written checklist that he ensures his team uses every time.

In a study by Geoff Smart at Claremont Graduate University, 51 venture capitalists were observed going about their daily job of identifying the right investment to put their money in. Smart identified six different styles these 51 smart people took decisions

1. Art critics: they assessed their potential investments intuitively, like you would evaluate art



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2. Sponges: assessed their bets by gathering more information, “soaking” up via interviews and on-site visits.
3. Prosecutors: evaluated their potential investments through aggressive and challenging interrogation
4. Suitors: focussed more on wooing proposals than evaluating them
5. Terminators: knew it all, skipped the evaluation bit and bought ideas that they believed in and fired entrepreneurs who did not toe their line
6. Airline Captains: took a systematic checklist based approach, evaluating all information and ensuring the discipline of checklist based evaluation for each and every prospect investment.

Geoff Smart's study revealed that Airline Captain VCs had 80% median return on investments while others had 35% or less. The likelihood of an Airlines Captain style VC firing the entrepreneur was 10%, compared to 50% for others. However despite the apparent advantages, only one in eight VCs took the Airline Captain approach.

Flight 1549 on the Hudson

Checklists are seen as effective yet boring. The Hero in us wants to take up a dare, a challenge-not go by a boring checklist. The world loves a hero.

On January 15th 2009, US Airways Flight 1549 made an emergency landing in the Hudson River. Captain Sullenberger, who steered the 155 passengers into safety, was acknowledged as the hero all over the world. Repeatedly Sullenberger clarified in his interviews that it was a team effort. Investigation into this close shave revealed that Sullenberger and his co-Captain went through their checklist as soon as the engines malfunctioned. They had never flown together before this flight but the communications briefing checklist was adhered by these pilots, just like all pilots in aviation sector. This helped them work together to land the plane on Hudson in relative safety. **Pilots know that checklists work.**

All professionals, irrespective of the sector, inherently work on three unwritten (or written) codes-selflessness, high level of skill (competence) and trustworthiness. **Pilots add a fourth dimension that others find difficult to inculcate-discipline.**

Humans are designed to be innovative, not disciplined-it needs to be worked upon. By incorporating the discipline of following checklists for more than seven decades, many lives have been saved. This discipline needs to seep into other professions and our daily lives as well.

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