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Contents

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FOCUS is a quarterly subscription journal devoted to the promotion of best practises in aviation safety. It includes articles, either original or reprinted from other sources, related to safety issues throughout all areas of air transport operations. Besides providing information on safety related matters, **FOCUS** aims to promote debate and improve networking within the industry. It must be emphasised that **FOCUS** is not intended as a substitute for regulatory information or company publications and procedures.

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focus
ON COMMERCIAL AVIATION SAFETY

"Sense and sustainability"

by Dai Whittingham, Chief Executive UKFSC

When FOCUS was published in the first quarter of 2020, it would be fair to say that none of us really expected the pandemic-driven meltdown of the entire global aviation system. The financial losses would have been catastrophic on their own, but the impact on individuals has been far worse. Beyond personal tragedies and those who continue to suffer from the effects of the disease, we have seen good people lose their livelihoods, flying careers end prematurely and businesses arrive at some far-reaching decisions seen as necessary for survival in the short term.

Aviation has been accused of being a key factor in the global spread of COVID-19; it is hard to maintain that moving infected individuals from country A to country B has had no impact. It has been difficult to persuade governments and people that the risk of becoming infected while airborne is less significant than community transmission, and some will continue to paint aviation as the bogeyman that harms the environment and spreads disease. While the industry strives to foster a just culture, you cannot escape the fact that we live in a blame society, so we can expect more of the same. It all adds to the pressure on those who lead and manage our industry.

The recovery, such as it is, has been hampered by the disconnects between policy, politics and common sense, both nationally and globally, which have made it very difficult for the planners and equally for potential travellers who have had to decide whether to commit their cash to a flight that could be cancelled with little or no notice for reasons well beyond operator control. Throughout the crisis, resources allocated to safety have been an easy target for savings, quite understandable given that many operators were not flying at all. On the other hand, many would argue that the overall safety risk in the system had gone up, not down; for example, there can be few regulators and operators that are not concerned by skill-fade, problems generated by lack of currency, the loss of skilled staff, and pressure from some quarters to take procedural short-cuts or turn a blind eye towards deviations from normal standards.

The pandemic has also reminded us that there is nothing like a genuinely existential threat to bring personal differences to the fore. What has been most surprising is the extent to which the COVID response has become politicised in many parts of the world, with some markets facing more extreme positions than others. Why some people chose to take their advice from (eg) an ill-informed teenage 'influencer' on social media is anyone's guess, but that is the world we now live in. Each to their own. However, the impact on normal operations has been clear, and not just in the time taken to pass through an airport. Differences of opinion have been at their most stark with mask-wearing, as can be seen from the seemingly inexorable rise in the number of related disruptive passenger incidents; in the USA alone there have been more than 5000 disruptive passenger incidents during 2021, of which 70% have been linked to mask policies. As we know, the distractions arising from these and other, often alcohol-fuelled, incidents are a significant safety issue.

The increasing incidence of violence on board is also a serious cause for concern, especially when it involves assaults on crew members doing their best to de-escalate petty conflicts, and there have been several disturbing reports of individuals attempting to force their way onto flight decks. Diversions resulting from disruptive passenger behaviour have been required on multiple occasions in the last 18 months and, whilst diversions are technically 'normal business', these events inevitably add risk to the equation whether that be from distractions, compressed timescales, lack of planning, or the subsequent pressure to restore the operator's network as soon as possible. We need to see common police, regulatory and operator responses to disruptive passengers, which may require the issue to be considered at a treaty level.

Resilience and Sustainability

While industry attention has understandably been focused on surviving the global shut-down, there have been many questions about resilience and more recently about sustainability. The two terms are of course linked. Sustainability has two principal aviation-related dimensions: economic and environmental. Similarly (and ignoring materials science), the concept of resilience can be approached from personal and organisational or systemic standpoints. We just need to be clear about which concept we are referring to when we say, for example: "We need to build more resilience into the system." Do we mean system, or do we mean more generally, including personal resilience?

To complicate the argument further, weak systemic and/or personal resilience can have a significant bearing on economic sustainability. If your business model requires aircraft and crews to be in the right place at the right time for customers, who will vote with their feet and wallets if you regularly fail to meet their expectations. So how many spare aircraft and crew do you provide? Can you afford the operating overhead? Have you screwed the turn-round time down so tightly that there is no slack to allow for the unexpected tech defect, or the need to de-ice?

On the personal side, there are genuine considerations about wellbeing, including fatigue management, and training. Can you afford to spend the right amount of time on training so that your crews are ready to respond to major challenges? Most military forces invest considerable time and resources in high-end exercises

during which plans, processes and capabilities can be put to the test, as conflict is not the moment to find that you have systemic and individual resilience problems. The aviation industry can't afford to practice at that level, so it requires a balance to be struck – those organisations that get it right will be resilient and economically sustainable. Which brings us to the other form of sustainability...

With climate change and environmental sustainability now firmly in political, public and corporate eyes, aviation is going to come under increasing pressure to reduce its impact. Just as operating restrictions were imposed on the industry by national responses to the pandemic, so we can expect to see greater limits placed on emissions, whether these are realistically achievable or not. Austria has already banned some short-haul flights and France has produced the first stage of legislation that will ban flights of less than 500km unless they are connecting with another leg from CDG. Voices are being raised in the UK too, arguing that all short-haul flights should be banned. Some commentators have suggested the French move is aimed at providing an unfair commercial advantage to a certain national carrier based at CDG while shifting passengers who might otherwise have used foreign-owned operators onto national rail services. Possibly so, but it is a good reminder that commercial aviation is vulnerable to the application of force majeure whatever area of the globe it might be operating in. And banning flights will have an economic effect unless alternative transport systems are in place with the right capacity.

The question now is whether the industry can act sufficiently quickly in generating environmental efficiencies that it avoids mandates that could render some current business models non-viable. What can we do about carbon capture? How quickly can we ramp up production and use of non-fossil fuels and alternative power sources? How would we manage the avoidance of persistent contrails (which contribute to warming) in terms of forecasting, promulgating, and planning, and how will we understand the trade-off between the effects on warming and the fuel penalty from operating at sub-optimal altitudes? How does replacing aircraft with greener alternatives stack up against the emissions involved in building the non-green version in the first place? Can we make simple improvements such as making duty-free goods available on arrival rather than on departure? (You cannot accelerate a bottle of spirits to flying speed, lift it to altitude and move it X nm without expending energy, which currently comes from fuel burn.) Should we be restricting the weight of luggage for passengers and maybe start using actual instead of assumed weights? What about waiting to start engines until after a pushback is complete, so the tug expends less energy?

In all the work to improve aviation's green credentials, we should not lose sight of the need to remain safe, and we need to ensure that any related safety implications are understood by the environmental lobby as well as by management and regulators. As an example, soon after the turn of the century the NATO airbase at Geilenkirchen (on the western border of Germany) had an issue with a line of trees that had grown to the point where they were intruding into the obstacle clearance plane. A campaign was mounted to stop the trees - which were just inside Dutch territory - from being lopped, and activists 'occupied' them to prevent any work being done. Matters were not helped by a Dutch government minister deciding to climb a tree to join the protesters herself. It was pointed out that the resulting performance limitations meant the military task, which both governments had signed up to, could only be achieved by launching a tanker to top the operational aircraft up with fuel or by flying additional sorties, all of which would be far more costly in environmental terms than simply trimming the trees. The activists were also advised that the potential damage from an aircraft being brought down by collision with the trees would outweigh any local environmental gains by an order of magnitude. Common-sense eventually prevailed.

The company SMS should be your friend where green improvements are proposed; changes for environmental reasons need to be managed through the SMS like any other form of change, and there should be sufficient intellectual challenge in the process to ensure that the safety implications are considered and risk-managed accordingly. As always, if risks are identified and mitigated, then the safety system has worked as advertised and the decision-makers have been provided with the right information. Whether the corporate decision-makers fully understand the safety risks being communicated to them is another matter - that is a subject for another time, as it is worth proper consideration.

Are You Match Fit

by Rob Holliday, Chairman UKFSC

Google 'rusty pilot' and you will find pages of links to news articles talking about pilots returning to flying and making mistakes because they are 'rusty'. In one article the writer links the correlation of a runway excursion to the pilots recently returning to flying, as the cause of the incident, a clear case of confirmation bias. Another claims there are dozens of reports of mistakes by rusty pilots in the USA, Air Safety Reporting System. The article highlighted an aircraft that departed on the wrong Standard Instrument Departure and another where the crew failed to lower the landing gear, which they identified at 800'. Issues that sound like they could be attributed to something more than a bit of 'rust'. But the facts never get in the way of a good story.

It is concerning that the narrative running in the press is creeping into operational vocabulary. In the recently published EASA document, SAFE 360° (8 to 10 June 2021) FDM Workshop – Analysis document 'Monitoring of new safety issues arising at the time of the pandemic' they state the following: 'It is unlikely that... flight crew performance (will) return to desirable levels as fast as flight activity does...'

Words have meaning. Words are powerful. Are they saying that flight crew aren't performing to desirable levels? We should not allow phrases like this to become part of our narrative. Pandemic attribution runs the risk of becoming a 'Snow White Mindset'. This is where a person believes they are 'an innocent, passive victim at the hands of others and circumstance, who is completely devoid of any responsibility' (The Chimp Paradox, Prof Steve Peters). We have to ensure our preparation is meticulous, take ownership of meeting the challenges that we face, have a plan and take professional responsibility.

What is a rusty pilot? How long does this subjective state last? A car can go on for years with weak spots in its body work. Is it a fact that all aviation staff returning to work after an extended lay off will be experiencing a condition analogous to metal oxidation? 'Hi everyone, the cabin service will be limited to drinks today because the caterers forgot to put the sandwiches on board. The caterers are not fully up to speed just yet' is not an announcement that anyone wants to hear.

So what are we dealing with? Pilots and all operational staff that are recent, meaning that they have completed the necessary training and checks to return to operations, but they are not current, meaning that they haven't been on operations for an extended period. The dynamic operating environment presents challenges that can only be simulated in training.

In football vernacular, a player returning from injury may have proved their physical fitness and practised the necessary skills to a high standard, but not be 'match fit'. In other words not be current, not fully up to speed with everything that the live dynamic environment of a competitive match will bring. Experience, coaching, process, limited initial exposure and game plan can to a large extent mitigate this.

In aviation we know that operational staff are returning to work after furlough. There are Safety Management System processes available to identify a risks and threats associated with this scenario and manage it. And we are very good at it. Applying preparatory measures to prevent events manifesting from a risk and controls to recover if the undesirable occurs. So if something happens, is it fair to say, that it's not attributable to being rusty, but it's a weakness in the mitigation? Instead of treating it as an inevitable consequence of not being current, such a weakness is reported so that it can be assessed with a view to strengthening defences. Instead of rusty, let's talk about better preventive measures and recovery through threat and error management.

In his book, Alone On The Wall, Alex Honnold, describes his free climb ascents of the most technically challenging climbs in the world, including El Capitan in Yosemite National Park, California. You may well be thinking, what does that have to do with aviation safety? But it is intriguing how this could possibly be successful. Is there something that we can learn from this?

Some of the steps taken to mitigate risk stand out. Preparation in the form of physical training and climbing the route multiple times roped up. As many times as necessary for it to be confidently completed without falling. The mental strength and self-awareness to climb down if it didn't feel right, even after waiting days for the right weather conditions to complete the climb. Personal responsibility is clearly a quality, but maybe implicit, because in a free climb there is, unlike aviation, a single point of failure and only one person who will be accountable for the catastrophic consequences.

Is it possible to learn anything from what at first sight seems to be a risky activity? In the aviation context, preparation is important, as is the empowerment to stay stop, let's think about this, before we proceed, and these can only be delivered by taking responsibility.

One difference is that we do not operate alone, so communication, sharing, listening and working as a team all come into the picture. To join these individual actions into collective success.

Understanding human performance will help understand and deal with the challenges that people will face returning to their operational roles.

ICAO has recently published: 'The first edition of ICAO's Human Performance Manual for Regulators (Doc 10151) with one primary goal in mind: to make it easier for people in the aviation system to do the right thing and to, therefore, avoid negative safety consequences.'

Dai Whittingham promoted this on LinkedIn, stating: If you work in aviation you should read this document. It is aimed at regulators but is relevant to all of us. ICAO thinks it is so important it has made it available for free.

There is a short introductory video at: - https://www.icao.tv/videos/human-performance

The document is available at: https://elibrary.icao.int/home/product-details/250419

In writing this article I was reminded of a picture on the wall of the flying school where I spent my early flying years. You will be familiar with the words on the picture: 'Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness incapacity or neglect.' I read this every morning for years and it is as true today, as operations gear up, as ever.

We have all been through a lot, but the over used phrase, 'we are all in it together' is not really true, because the adverse effects on people are wide ranging and far from the same for everyone. Mental health has to be taken seriously and help provided. Without underestimating the difficulty of someone suffering from mental health issues coming forward, it is crucial that people take personal responsibility and ask for help and, of course that help is given. The Flight Safety Foundation document, An Aviation Professionals Guide to Wellbeing, with contributions from Dai Whittingham, Paul Cullen, amongst others, is important in raising the profile of this issue.

In short, the sensationalist press articles should not be allowed into our vocabulary. We don't make excuses. We build an understanding of the risk and put in place prevention and control measures with a feedback loop to continually refine and improve, in the best traditions of safety management. The recovery of operations is demanding, but we have the people in aviation with the tools, skills and professionalism to do it successfully.

What's Going On Up There? Assessment Of Pilot Compliance With TCAS RA

by Stanislaw Drozdowski & Mateusz Michalski

TCAS Resolution Advisories are not everyday events for pilots, but dealing with them is part of the job. So how many RAs are flown correctly? Stanislaw Drozdowski and Mateusz Michalski report on a study of nine million flight hours, with some concerning results.

KEY POINTS

- Anecdotal evidence suggests that pilot responses are often neither prompt nor accurate. To obtain a wider view on the quality of pilot response, we performed an assessment using radar data.
- Only 38% of RAs were classified as "followed", and 58% of all RAs were flown in the opposite direction or not followed.
- The percentage of RAs followed 12 seconds after the RA improved markedly. But almost a third of RAs were not flown correctly and the proportion of excessive reactions doubled.
- Although the assessment using radar data comes with some limitations, it clearly indicates that the level of pilot compliance with TCAS resolution advisories is low.
- Aircraft operators should monitor carefully crew performance, to understand what influences performance, and take corrective measures as necessary.

The development and implementation of the Traffic alert and Collision Avoidance System (TCAS) was driven by aviation accidents. When there is a risk of collision, TCAS will issue a Resolution Advisory (RA) telling pilots how to change or limit the vertical rate to avoid a collision, so a prompt and accurate pilot response to all RAs is particularly important. While pilot responses are typically only assessed in serious incidents, anecdotal evidence suggests that pilot responses are often neither prompt nor accurate. To obtain a wider view on the quality of pilot response, we decided to perform an assessment using radar data.

The radar data for this assessment was gathered in core European airspace over a period of 12 months. An aircraft's transponder downlinks Mode S radar messages providing details of RAs and RA termination on each radar interrogation, as well as details of the threat aircraft. These messages – RA downlink messages – were used for this study.

The assessment of pilot compliance with TCAS RAs using radar data comes with certain limitations. Firstly, radar data is subject to surveillance delays (due to radar rotation) – any downlinked event occurred up to three seconds before the time of downlink. Secondly, the aircraft's altitude and vertical rate may be inaccurately determined by the ATC system tracker. In order to deliver optimal display performance of radar data to air traffic controllers, the ATC system tracker software makes assumptions regarding the estimated position of tracks and approximates the data accordingly. Finally, for some RAs, Mode S downlink messages do not provide all the details required for the assessment.

Ideally, the assessment of pilot compliance with RAs should be conducted based on airborne recordings (Flight Data Recorders or dedicated TCAS recorders), which provide a level of detail that is not available from ground-based systems. Aircraft operators regularly assess compliance of their crews. However, they typically do not share the results of their studies. While results coming from individual carriers may be occasionally available, that does not provide a system-wide view.

How many RAs are happening up there?

In the first step of our study, we examined the frequency of RAs. The radar data consisted of over nine million flight hours and contained 1,022 encounters (events in which at least one aircraft received an RA) and 1,373 RAs, i.e., an RA occurred every 6,567 flight hours, making an RA an infrequent event.

In the majority of encounters (84%), only one aircraft involved in the encounter received an RA. This was because of one of two reasons: the threat aircraft was not TCAS equipped, or the geometry of the conflict required an RA for just one aircraft.

Low? High? Or everywhere?

Most RAs occurred above FL180 (67%). The distribution of initial corrective RAs (i.e., RAs requiring a change of aircraft's vertical rate) by altitude is shown in Figure 1.

What type of RAs are occurring up there?

When two aircraft are converging horizontally and with high vertical rates (i.e., climbing or descending towards their cleared levels 1000 feet apart), TCAS may trigger an RA even though the ATC separation is correctly applied. This is because TCAS calculates a risk of collision based on the closing speed and vertical rates. Therefore, high vertical rates while approaching the cleared level may cause the TCAS logic to predict a conflict with aircraft at the adjacent level. In these cases, TCAS will issue a Level Off RA, instructing the pilot to reduce the vertical rate to 0 ft/min. In congested European airspace this is a common scenario, so quite predictably Level Off RAs top the list of all RAs (66%). The distribution of all recorded RAs is shown in Figure 2.

So, what is really going up there? Do pilots follow RAs?

A simple answer is "not quite". ICAO standards assume the pilot will start response to an RA within five seconds. Depending on the vertical rate at the time when the RA was issued, it may take the

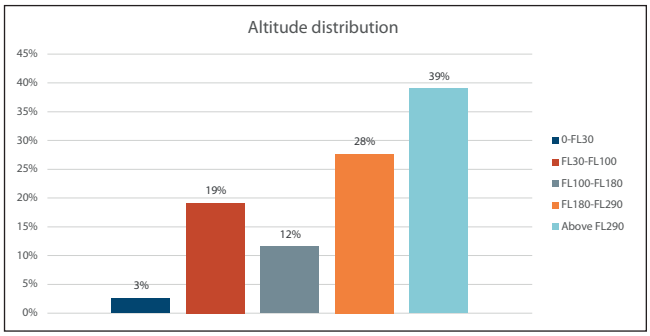


Figure 1: Altitude distribution for first corrective RAs

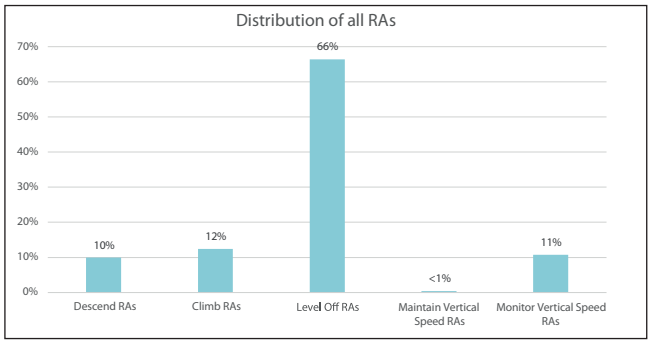


Figure 2: All first RAs taken into assessment

pilot more than five seconds to reach the rate required by the RA. Given that, and the limitations of the radar data, only RAs with duration longer thaneight seconds were initially evaluated.

In line with the IATA/EUROCONTROL guidance material (IATA/EUROCONTROL, 2020), the pilot responses were categorised as follows:

- Followed: when the required vertical rate was achieved within eight seconds after the RA.
- Not followed (too weak response): when any change was not sufficient to meet the vertical rate required by the RA. Too weak a response carries a risk that the required vertical spacing will not be achieved.
- Opposite: when the achieved vertical rate was in the opposite vertical direction to the required rate.
- Excessive: when the achieved vertical rate exceeded the required value. Any excessive responses increase the risk of a follow-up conflict (with another aircraft) and are disruptive to ATC.

The overall picture is not very encouraging (see Figure 3) with only 38% classified as "followed". More than half (58%) of all RAs were flown in the opposite direction or not followed.

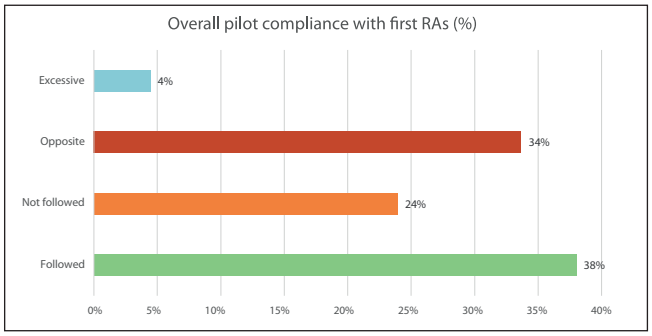


Figure 3: Pilot compliance with first RAs - 8 seconds or longer

The best compliance was achieved for Level Off RAs (40% followed), but also approximately 40% of Level Off RAs were flown in the opposite direction (i.e., the vertical rate was increased rather than reduced). For Climb and Descend RAs, pilot responses were classified in the range of 20-25% as followed; however, 57-65% of these RAs were not followed correctly and 6-20% were flown in the opposite direction.

Given the poor level of response determined at eight seconds after the initial RA (or more precisely, eight seconds after the RA has been downlinked to the ground system, so up to 11 seconds after the RA), pilot responses were further assessed at 12 seconds after the RA, provided the RA lasted longer than 12 seconds. Initial RAs with a duration shorter than 12 seconds were disregarded. The expectation was that these responses would show an improvement associated with the time frame extension, thus giving the pilots more time to respond and achieve the required vertical rate. Indeed, as shown in Figure 4 the percentage of RAs followed improves markedly. Still, almost a third of RAs are not flown correctly. Interestingly, the proportion of excessive reactions doubled.

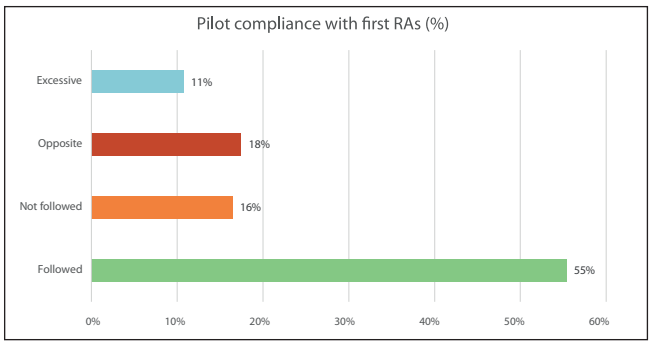


Figure 4: Pilot compliance with RAs - 12 seconds or longer

What happens if RAs are not followed?

In cases where the initial RA will not provide sufficient vertical spacing, the RA will be modified to either increase the vertical rate or reverse the vertical sense of the initial RA. For strengthening or reversal RAs, prompt and correct pilot responses are particularly important. On the other hand, if the collision avoidance logic determines that the response to the initial RA will provide sufficient vertical spacing, the initial RA will be weakened to limit any unnecessary altitude deviation.

Secondary RAs were issued in 171 cases (12% of all RAs) and most of them (over 81%) were weakening RAs. Almost a fifth of RAs were strengthened or reversed and half of them were not followed or were flown in the opposite direction. This is particularly concerning. Globally, the compliance with the second RA is much better than with the first RA (48% vs 38%; see Figure 5).

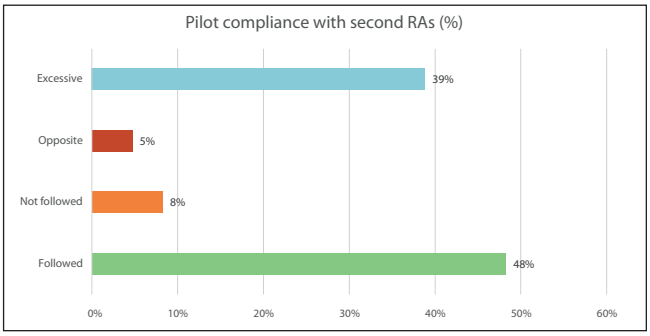
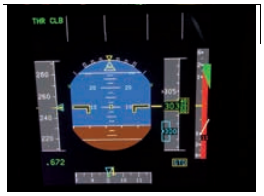


Figure 5: Pilot compliance with second RAs - 8 seconds or longer

Some RAs are not followed, but does that make a difference?

The study has revealed that a significant proportion of RAs are not flown correctly. Is this just a procedural breach or does it degrade safety? Unfortunately, the study could not determine whether safety is degraded if pilots do not follow RAs correctly. However, it is reasonable to conclude that any incorrect responses to RAs in critical circumstances may lead to a collision. Such circumstances cannot be assessed until after the event.

The study found a number of cases where, in the absence of correct pilot response, vertical separation at the closest point of approach was significantly reduced. However, these cases could not be used to give quantitative assessments because they were not frequent enough to draw statistically significant conclusions. Moreover, the achieved vertical separation was affected by additional factors, including: pilot responses to modified RAs; manoeuvres of the other aircraft in the encounter; in case of Level Off RAs (which are typically issued when the aircraft are still separated) any degradation of separation is difficult to detect.



Conclusions

Although the assessment using radar data comes with some limitations (which could be overcome if less readily available airborne data were used), it clearly indicates that the level of pilot compliance with TCAS resolution advisories is low. These results are in line with anecdotal evidence from various sources.

Prompt and correct responses are particularly important for reversal and strengthening RAs. Unfortunately, in over half of the cases pilots did not react correctly to these RAs. This again emphasises the need for aircraft operators to monitor carefully crew performance, to understand what influences performance, and take corrective measures as necessary.

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Note: Since the report on pilot compliance with TCAS RAs has been published, EUROCONTROL have received several comments. To address these comments, the study is being expanded to provide the view on pilot compliance with different granularity and using another assessment approach. Once the update is ready, it will be published on SKYbrary.

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Third country components after Brexit – keeping the pipeline open without compromising safety

by Alex Johnson & Ashleigh Ovland, Holman Fenwick Willan LLP

As has been well documented elsewhere, the UK left the EU on 31 January 2020, and the ensuing transition period ended on 31 December 2020. As such, from 1 January 2021 EU aviation safety legislation, including Regulation (EU) 2018/1139 establishing EASA, no longer applies to the UK. This means that, as well as no longer being an EU Member State, the UK's status as an EASA member has also ended.

The EU and EASA have a wide array of arrangements in place with third countries in relation to aviation safety which provide, amongst other things, for the mutual certification of aircraft components.

In the months leading up to and following the end of the Brexit transition period, the CAA has been hard at work negotiating agreements with third countries to ensure a degree of post-Brexit continuity in the field of aviation safety. The air safety arrangement entered into in late August 2021 between the CAA and the Civil Aviation Administration of China represents something of a milestone for the CAA in this process. This article looks back at what the agreements are, why the UK needs them and highlights where the UK has got to so far with some significant third countries.

Pre-Brexit

One of the principal ways in which the EU seeks toT safeguard aviation safety and facilitate the free movement of aviation components into and out of Europe is though agreements with third countries. These agreements generally take two forms:

- **Bilateral Aviation Safety Agreement (BASA).** A BASA is signed between the EU (and its Member States) and a non-EU country. Its aim is to facilitate the mutual acceptance of certificates. EASA supports the European Commission during the negotiation and implementation of such agreements. So far, the EU has concluded BASAs with the US, Canada and Brazil.

- **Working Arrangement (WA).** A WA is usually signed between EASA and the authority of a non-EU country, or a regional or international organisation. It covers matters of a technical nature. It is typically used to facilitate certification by EASA or the validation by a foreign authority of EASA certificates. Unlike BASAs, WAs do not allow for the mutual recognition of certificates. EASA directly negotiates and concludes such arrangements.

Prior to 1 January 2021, the UK – in its capacity as an EU Member State – was a party to any BASA entered into by the EU with a third country. Moreover, the CAA was bound by WAs entered into by EASA, which acted as its technical agent.

Post-Brexit

From 1 January 2021, the UK is no longer an EASA member, and the EASA regulatory regime has ceased to apply. We examine in brief below some of the key agreements entered into by the UK to date in relation to the post-Brexit certification of aircraft parts. It should be noted that membership of ICAO provides a base level of confidence in the safety regimes of other ICAO member states, so the UK has chosen to focus on what it sees as the key jurisdictions.

EU

On 24 December 2020, the EU and UK negotiators agreed on a Trade and Cooperation Agreement (TCA). The TCA contains an EU-UK Air Safety Agreement, which in turn includes an annex that addresses aircraft design certification and production. Subsequently, on 17 May 2021, the CAA and EASA concluded negotiations on the Technical Implementation Procedures (TIP) which sets out the measures the aerospace sector must take in order to design and produce new aerospace parts moving between the UK and the EU.

Importantly, pursuant to this arrangement all EASA certificates, approvals and licences in effect on 31 December 2020 for use in the UK aviation system and on UK-registered aircraft will be recognised by the CAA for up to two years.

China

As mentioned earlier in this article, on 25 August 2021 the CAA and the Civil Aviation Administration of China signed a WA on the reciprocal acceptance of Production and Airworthiness Approval.

The WA allows for the export of new and used aircraft, products, parts and appliances between the UK and China, retaining the arrangements which were in place when the UK was a member of the EU. Indeed, the WA states that its purpose is *"to allow the continuity of cooperation following the exit of the UK from the EU"*.

USA

The UK's air safety arrangements with the USA are extensive, which is perhaps unsurprising given the USA's role as a significant player in the fields of aerospace manufacturing and regulation.

The UK has a long-running BASA in place with the USA, dating back to 1995. Pursuant to this BASA, in March 2019 the CAA and FAA agreed a set of Implementation Procedures for Airworthiness (IPA) in order to ensure the continued cooperation between the two authorities in the event of a "no-deal" Brexit. The CAA and FAA then signed an updated version of the IPA on 15 December 2020. Further, on 6 July 2021, the two authorities signed a Special Arrangement under the IPA, to provide for the continuity of UK-USA aircraft certification projects. This Special Arrangement replaced a previous version of the same document, which had been agreed in anticipation of a "no-deal" scenario.

Brazil

The CAA and Brazil's National Civil Aviation Agency (ANAC) signed a Memorandum of Understanding (MoU) on 2 December 2020. The MoU recognises that previously the export and import of components between the UK and Brazil occurred under the terms of the EU's BASA with Brazil, and requires the establishment of TIP to facilitate co-operation between the two authorities. The relevant TIP Agreement was signed on 22 December 2020. An ANAC press statement confirms that it is intended that the MoU and TIP will *"guarantee the continuity of the bilateral procedures currently practiced under the Brazil-European Union Agreement"*.

Singapore

The CAA and the Civil Aviation Authority of Singapore entered into an MoU on 18 December to facilitate co-operation between the two regulatory bodies. Notably, the MoU states that the CAA and its Singaporean counterpart will establish a Bilateral Aviation Steering Committee in order to develop and coordinate such co-operation. While there is nothing to suggest an imminent move away from the existing regulatory regime, it will be interesting to see what future developments the Steering Committee might facilitate.

Conclusion

To date, the outcome of these numerous bilateral negotiations has been very welcome continuity. However there has been no shortcut to achieving this, and the CAA continues to devote significant time and resource to piecing together a coherent safety regime governing global imports to the UK.

Future divergence from the EU's rules governing components from third countries is now a risk that will have to be monitored and managed on a country-by-country basis.

Alex Johnson – Trainee Solicitor, HFW
Ashleigh Ovland – Professional Support Lawyer, HFW

The Black Swan

by Capt. Jacky Mills, former Chair UKFSC (2016 – 2020)

I think most of us have heard of the Black Swan but what exactly is a Black Swan event in the context of aviation?

These are defined as events which are very hard, almost impossible, to predict, and at least rare enough to be beyond the realm of normal expectations. A term which is often used in aviation to explain that all known threats have been addressed in the relevant Risk Assessment, with the exception of the Black Swan event...

Its origins are actually from Ancient Greece where it was assumed that a Black Swan could not exist, but it was unexpectedly discovered in the wild many years later.

In the aviation world, this would normally be an aircraft accident which came totally out of the blue and was not foreseen by any risk assessors or safety professionals.

The terrorist atrocities in New York - 9/11 – which rocked the whole world and were certainly not ever dreamt of in any worst nightmare scenario prior to the decimation of the Twin Towers and the thousands of deaths. 9/11 would be described as a 'Black Swan'. The flight into a flock of Canadian Geese shortly after take-off taking out both engines of the Airbus, and the subsequent successful landing on the Hudson River, is another. Although bird strikes and wildlife management continue to be on many Risk Registers, the event which takes out both engines simultaneously and catastrophically, is pretty unusual.

The A330 aircraft which suffered fuel contamination and subsequent loss of thrust from both engines on final approach to London Heathrow, which was landed just short of the runway, could also be described as 'beyond the realm of normal expectations' and a so called 'Black Swan' event.

Black Swan events will by their very nature, always continue to be a part of aviation. If they could be predicted some of these could at least, be mitigated against. If possible, and dependant on the event it wouldn't necessarily be possible of course, barriers could be put in place. As it is, the resulting innovative thinking of the flight crew, along with the prevailing circumstances, can only determine the outcome.

I am lucky enough to overlook the Leeds-Liverpool canal from my lounge windows and spend a lot of time enjoying the countryside from the towpath. Ducks, geese, a crane, and several sets of white swans often accompanied by their cygnets, are a familiar sight on the water, and are a pleasure to live amongst. So when in January of this year I spotted a black swan had taken up residence on the canal I was surprised and, I have to admit, just slightly concerned. Was this a premonition of what was to come in 2020?
The COVID-19 Pandemic could indeed be described as a Black Swan event – a worldwide Pandemic has not happened for more than a hundred years, and its wide-reaching effects have both shocked and truly shattered the world. The aviation industry has been particularly seriously impacted.

No aircraft accident occurred as a result of this virus, but without a shadow of a doubt, it has had adverse effects on global aviation which may ultimately prove to be to a far greater extent than the tragic events of 9/11. The Black Swan which shook the world back in 2001 took the industry many years to recover from, estimates are it was six years before capacity was back to pre-9/11 levels. 9/11 caused the steepest decline recorded in history prior to the COVID-19 Pandemic.

How long the pandemic will ultimately be drawn out over and its cumulative effect on the aviation industry is yet to be played out, but indications so far are not good.

Before COVID-19 could any of us have ever imagined the scenario of being 'locked-down' at home? Told we must work from home where possible, and that we could not even leave our homes except for a very few specific reasons which were pretty much considered necessary for survival. Millions of employees being paid 80% of their salary by the Government to sit at home and do nothing. If it wasn't so real it would have made a great novel, in fact, many people have said that they felt like they were a player in the middle of a disaster movie.

The financial implications of the enforced grounding of most aircraft in Europe, is not hard to guess. A significant recession is a certainty, with not all Airlines who went into it surviving to come out the other end still in business.

Even those which were healthy, robust and successful Operators at the beginning of 2020 will be seriously affected fiscally . All outgoings will have to be very carefully examined, by necessity, and a new 'modus operandum' developed. What that will look like is impossible to say, but it will certainly look very different to the world we had in our minds at the end of 2019.

It will likely be a time when all the support teams within the airline will have pared back resources compared to that which was available previously. So, more than ever it will be necessary to carefully prioritise what to focus resources on, and endeavour to ensure time is spent wisely when investigating and mitigating the current risks and threats to flight safety, which is far from easy.

This means that the safety professionals will have to be as focused and adept as ever, at using the available budget. Smart use of resources will be even more vital than ever. It is important to remember that your Safety Management System must be pliable and adaptive to your business in the current times, that is the purpose of the SMS, to serve you well in any circumstances. I would offer that there is no more important time than now to make it work effectively for you and your challenges in this climate.

The Safety Space, which you may be familiar with, shows the delicate balancing act which will be facing the airline industry over the next months and years. The reality is that an airline can be the safest out there but if it is not profitable it will not survive, so there is always a balancing act between the investment in safety and profitability. The number one priority is a mutual priority to ensure survival; it is a commercial balancing act.

The highest level of safety is absolutely demanded by the passengers and any deviation from this will always make headline news. The prevailing culture within any airline has a significant impact on safety and a positive culture endemic within the business is cost effective in spades.

We have been here before, of course... very sadly several UK airlines had already disappeared prior to the dawning of 2020 pandemic. But many others who were operating had successful, proven business models and the future looked pretty rosy, have now naturally hit very rough waters.

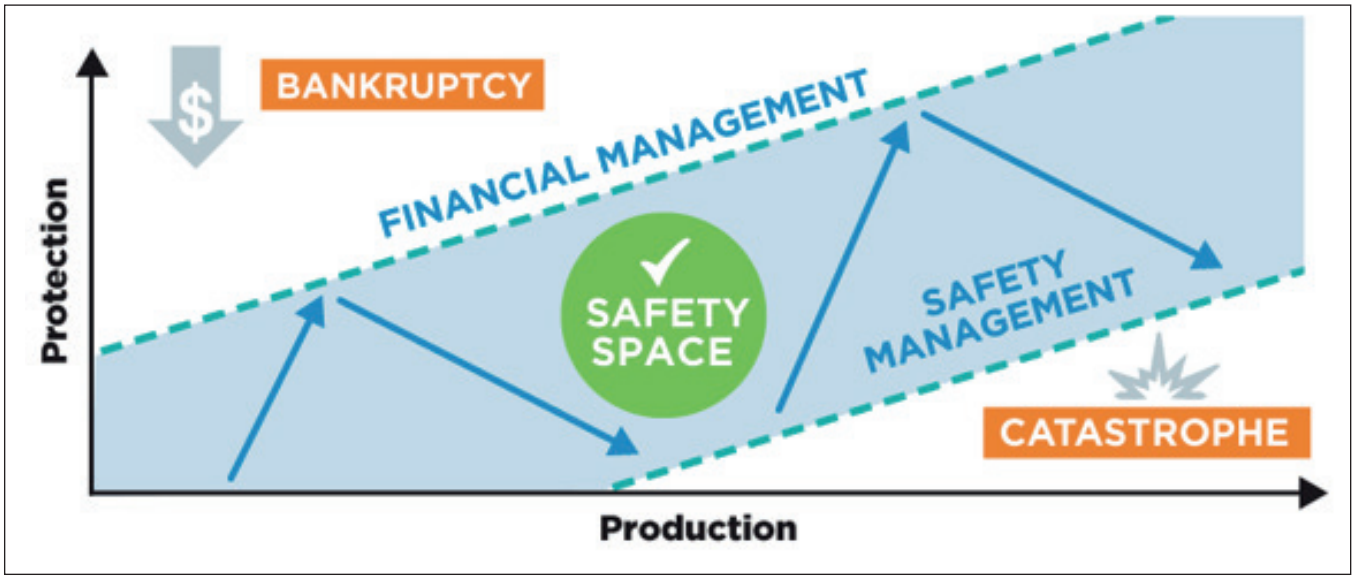
Passenger traffic prior to the pandemic was increasing year on year, and that was predicted to continue. News headlines were regularly discussing the proposals for a third runway at London Heathrow to ensure that the UK kept pace with the industry's predicted continued expansion.

Then dawned 2020 with a widespread and comprehensive grounding of many airlines, followed by a return to operations which in reality, was considerably less significant and constant, than had been hoped.

A bid to return to flying programmes in the Summer has been thwarted in the UK with 'safe corridors' being removed with barely any notice, and mandatory quarantines being imposed at the last minute on passengers' return from a trip abroad. This has resulted in both a reluctance to commit to a holiday or any travel overseas, and a constant change of flight schedules for the airlines in a bid to both protect their passengers and maximise availability to 'open' destinations.

So, instead of some three months with few flights with airports typically reporting a reduction in passengers of up to 95%, followed by a gradual but fairly swift return to normality, it has been a constant stuttering stop – start – stop pattern. As I write this we are moving towards winter and a second national lockdown in England, with similar restrictions in place in Scotland, Wales and Northern Ireland. A return to anything like previously thought of as 'normal' operations is seeming nothing but a distant dream.

'Working from home' wherever possible and 'Zoom' calls have become the 'new normal' for previously office based personnel, with face to face meetings a thing of the past, and 'virtual' meetings taking place over the internet as the norm on a daily basis.



And the truth is, some operators and other businesses have found, in a lot of cases, to be an efficient use of time with significant fiscal advantages. However, the ongoing mental health issues this practice has caused are still to be determined, suffice to say it is also expected to have negative consequences with isolation and lack of human contact bound to be felt, as well as other unintended consequences.

So, what are the emerging threats within aviation as the industry adapts to the new procedures and practices required to operate aircraft whilst living with this virus?

Some airlines had continued operations throughout the year, predominantly the Cargo sector, some rotary operations such as the vital Air Ambulance flights, as well as the continuance of a reduced number of Domestic and International passenger flights. These Operators had to introduce a new way of working along the way by introducing the wearing of masks, and other changes such as changes in the embarkation and disembarkation processes.

This was, and continues to be, a hard time for all areas of the sector, affecting Regulators with an equally challenging remit of developing new guidelines for safe and robust operations in a world not seen previously. There was no previous business model to copy.

Risk Assessments have been drawn up and agreed 'on the hoof' whilst introducing the new practices now required for everyone's safety, as they went along. This was obviously a significant challenge, but as we know, the airline industry has shown many times in the past that if there is any industry that knows how to deal with a crisis it is aviation.

With many borders closed altogether, and travel to other territories not recommended unless absolutely necessary by Governments, a significant number of Operators had stopped flights altogether for several months, parking fleets of aircraft up until lockdowns were eased around the world.

Clearly aircraft cannot just sit around doing nothing for months, and then be started up again. Routine minimum maintenance was required, or a constant number of short flights for each airframe needed to negate the need for extensive engineering attention.

A subsequent return to flying operations presented a huge challenge, for both man and machine, having never been through such a scenario previously there was no template to follow. With guidance necessarily being published with little time for compliance, a proactive, flexible plan to restart was the only way forward.

Skills fade is an inevitable outcome of the slowdown and/or temporary layoff, pilots cannot retain their skill sets sat in their gardens or home schooling their children. A complicated plan of returning personnel to the workplace, trainers first, was required to bring some of the flight crew back to flying feeling confident and refreshed enough to restart operations, whilst many others remain still on temporary leave of absence today.

A skills fade can also affect the support teams of the airline, all the other vital cogs that make up the machine which launches a flight safely and expediently. With Operators only bringing essential workers back into the business as necessary for fiscal survival, personnel are being required to wear several 'hats' and pit their skills to several different areas.

We must not forget the significant concern of mental health issues due to the uncertain times we are going through, and for some flight crew the additional worry of potential redundancies. This has been raised as a safety threat in previous periods of downturn within the aviation sector. The introduction of P-PAN the Peer-Pilot Assistance Network for all commercial operations is optimally placed to address this threat and Operators will have put specific procedures in place to capture this.

We know that, sadly, during the course of 2020 some airlines have already had to make members of their flight crew redundant, and others may be undergoing redundancy consultations as we speak. This is undoubtedly a threat to flight safety, with some flight crew members having to continue to operate under such pressure and uncertainty.

Others have temporarily laid off flight crew on a reduced salary, or even no pay, for a period of time until operations pick up again.

So the year of the pandemic has been challenging, without a doubt, for those Operators who have survived, and tragic for those who have gone out of business.

How much longer these dark days of lockdowns, travel corridors and quarantine periods will go on is indeterminable, but the end is certainly not in sight yet.

The world has certainly had to adapt a great deal to life with COVID-19 while the aviation sector endeavours to make travel by air as safe and seamless as is possible.

I pay tribute to all the Airline's Leaders, Flight Crew, Cabin Crew, Engineers, Dispatchers, Ground Crews, Operations and Schedule Planners and all the many Support Teams within each and every airline who have created, adapted and made their operations workable in this extremely challenging climate.

All have made personal sacrifices and huge changes to their working days to support the industry.

I pay tribute to the professionalism which continues to be so evident and I wish you and your families all strength and courage along with continued good health as we strive to get to the other side... Which We Will.

COVID-19 Survival Report

by Capt. Stephen Randles

I thought I'd been really careful. I'd worn a mask and sanitized my hands whenever I'd been handling objects outside my home. I'd followed all the rules and successfully managed to work in the simulator, in the classroom and stay in hotels provided by my company after the initial lockdown at the beginning of last year. I had no contact with anyone who had had COVID and despite meeting a significant number of people very few knew of anyone who had suffered with the virus.

Then, at the beginning of December 2020, I woke up one morning and I didn't feel right. My arms and legs ached and I felt 'under the weather'. I had a standard flu inoculation a few days before and I thought this might be an adverse reaction to that. As the days passed, I started to get other indications that things were not quite right: I lost my appetite, I felt tired all the time and I had an overall feeling of being unwell. None of these are on the list of 'classic' COVID symptoms so the thought that I had the virus did not occur to me.

Fortunately, I had signed-up to a COVID-19 study in which you upload information daily to an app about how you are feeling. After 3 days of inputting this data, the app advised me to get a COVID test. The study for which this app provides data has the authority to authorise COVID tests despite not having the 'classic' symptoms which the Government normally requires before allowing a test. The C-19 Study has identified dozens of COVID symptoms in addition to those nominated by the Government. I had the test on 15 Dec and was notified 2 days later that I had tested positive for COVID-19. I had already imposed a self-isolation on myself and I was now notified officially to do so.

For about a week I remained at home with no significant change to how I felt. My limbs stopped aching but the general feeling of malaise remained and I couldn't focus on doing anything at all and I had no energy to do anything even if I wanted to. By 21 Dec I was feeling worse. I was becoming breathless with any exercise and I needed to sit down after walking up the stairs. I had a video-consultation with a doctor who prescribed an inhaler to help my breathing. I woke on 22 Dec knowing that there was now something seriously wrong with me. I was finding walking difficult with me becoming breathless very quickly. I called NHS111 who very quickly said they would get my GP to call me.

That call came through very quickly. My GP immediately decided that he needed to see me and arranged a consultation in the surgery carpark. He came to the car dressed in full PPE and slipped an oximeter on my finger. He thought the device was not working properly and returned to the surgery for a replacement. He brought out 2 other oximeters and it was only when all 3 returned the same result of really low oxygen levels in my blood that he said that I needed to be in hospital immediately.

By that stage, I knew that hospital was going to be the answer. I was feeling really unwell. On the way to hospital, I could feel myself deteriorating further and knowing that no visitors or assistance were allowed inside the hospital, I wrote my name, and doctor's details on my phone. I was dropped off right outside the entrance to the Horton Hospital in Banbury with about 20 paces to the door. I only just made it inside. As I entered, I started feeling dizzy. A passing nurse asked if I was ok to which I obviously replied "Yes, I'm fine". "I don't think you are" she replied and guided me towards a wheel chair. Once I sat down, I was really short of breath and I could not speak. I was glad that I'd written my details on the phone.

The next thing I remember is being in a small consulting room with a fairly large group of nurses and doctors working around me. I already had an oxygen mask on and a canula had been inserted into both forearms. After a short time on the oxygen, I began to feel much better and could hold a conversation with those around me. All sorts of tests were done: blood drained, COVID test, a test for MRSA, an ECG and x-rays of my chest are the ones I remember. Results came back showing that I definitely had COVID and that it was seriously affecting my body.

There were indications on the x-ray that my lungs had taken a bit of a battering explaining the shortage of breath and the blood tests showed that my kidneys and liver had been adversely affected. Furthermore, my potassium level was dangerously low. Potassium is used by the body to control and regulate heart rate and I had almost none. Two hours passed in the consulting room during which time I acquired an additional canula in my right wrist, a canula with 4 inputs in my femoral artery in my groin, a catheter as I was going to be bed-bound for a while, an oximeter on one of my fingers and permanent wiring for an ECG.

At the end of the 2 hours, a consultant and 3 other doctors came to tell me what was required. I was to be admitted to the Critical Care Unit (CCU) where oxygen under pressure could be administered to me. They had been granted permission for me to be given Remdesivir an anti-viral drug. I was also put on steroids to help my lungs recover and a cocktail of other drugs to help my kidneys and

liver. Some others drugs helped offset the adverse effects of those designed to help me. I was then wheeled in my bed around to CCU where the complicated process of getting me off the bed I had been on and onto the CCU bed began. I was quite happy that I could manage to get myself across but it took 4 nurses to ensure that all the gubbins that was attached to me moved at the same time.

Once settled into my CCU bed a vice-like plastic contraption was fitted to my head and an oxygen mask fitted quite firmly to my face. Oxygen was then provided at quite high pressure. I was thankful then for all the hours I had spent at RAF North Luffenham when I was in the RAF being taught and practising pressure breathing. Pressure breathing requires the body to do the reverse of normal breathing. Normally your diaphragm moves down to suck air into the lungs and you then relax to allow the air to be exhaled. With pressure breathing, when you relax the oxygen is forced in to inflate your lungs. You then have to use your diaphragm in the reverse sense to force the air out against the incoming pressure. I took to it in the CCU like a duck to water. I knew what I was doing, but more importantly I could feel the therapeutic effects almost immediately. I knew then that I was going to be ok.

I spent 9 days in the CCU. The combination of pressure breathing and drugs gradually made an impression and I slowly began to feel better. As the days went by, the pressure of the oxygen was gradually reduced as my lungs regained some of their ability to absorb oxygen. Eventually, I was taken off the pressure breathing completely and was just given supplemental oxygen at ambient pressure. My lungs were still not up to doing everything by themselves. About the same time as the oxygen was changed, I began to feel as if I was actually getting better. I will leave you to complete the second alliterative word here but since arriving at the hospital I had been feeling shockingly s***. Really unwell. I now knew there was something wrong but not that bad anymore.

Once the doctors were happy with my progress, I was released from the CCU into a general COVID ward. Here the staff tried to wean me off the oxygen altogether; a precondition being allowed to go home. However, they found that the oxygen levels in my blood were insufficient without some oxygen. I was sent for a CT scan which revealed that the damage the COVID had done to my lungs had caused a Pulmonary Embolism and this clot was now preventing my lungs from absorbing oxygen properly. The answer was to increase the dose of the blood thinning drug I was already on. The 'standard' dose of Delteparin is 5000 units twice a day. I was prescribed the maximum dose of 10,000 units twice a day. This always caused a delay when the pharmacy nurse came around because they had never seen such a large dosage before and always double-checked with the doctor before giving me the injection. The Delteparin had the desired effect and after a few days I was given a release chit and allowed home after 14 days in hospital.

I am at home now, but far from being fully recovered. I still take pills to thin my blood to ensure the embolism diminishes completely. I'll be on those for another 3 months at least. I still get short of breath and will continue to be like that until my lungs fully recover. I am really grateful to all the staff at the Horton Hospital who undoubtedly saved my life. My regret is that I do not know what any of them look like. All the nurses and doctors were double-wrapped in PPE with masks and visors. Apart from their eyes I know nothing about their features. I could walk past them in a street in Banbury and not know that they played such a big part in my survival. I have set myself a task once I am fit to find out who they all are.

COVID affects people in many different ways. You do not know how it will affect you until you get it. Please, please do all you can to avoid getting this virus. It is a killer and you do NOT want it.

Safety First! Or Not?

by Capt. Wolfgang Starke

We often hear the slogan, 'safety first'. But what does this mean in practice? Captain Wolfgang Starke considers the question from a pilot's perspective, finding that time and cost pressure make trade-offs riskier.

KEY POINTS

- Pressures of time and costs can lead to a shift in priorities and greater acceptance of risk.
- Significant reductions in safety may not be apparent from single assessments of operational risk, but a reduction of flight safety may be more obvious from a combination of changes to practice.
- There is an urgent need to resist and address production pressures, and focus more on safety.

It is a long-standing term in aviation. Most airlines promulgate "safety first". But does this really still reflect reality? With increasing costs, high compensation fees in case of delays, tightened rosters, staff shortage, and everlasting slots all around Europe it somehow seems that the race for number one priority is up.

Landing with tailwind

During a routine day, a crew of a domestic flight was approaching their destination. Weather was quite welcoming, but some variable winds were prevailing. Despite a significant tailwind, the crew elected to continue the approach into their destination airport. Following a runway excursion during landing, the final report listed, despite others, time pressure as one of the causal factors.

Nowadays, we still see numerous runway excursions during landing, often overruns as a result of tailwind landings on wet runways. Pilots and controllers know this risk quite well. Still, controllers offer these options to pilots – intending to do the pilots a favour – and pilots request these riskier approaches and landings.

So we should ask ourselves, why? Often, pressures of time and costs influence these runway excursions. The airlines, of course, never educate their pilots to take unnecessary risks. However, pilots understand the results of delays, cancellations and high fuel costs. This knowledge of economic considerations can, especially in a situation of tough competition between airlines, lead to a shift in priorities.

The safest way to land and take-off is into the wind. ICAO has stated conditions for selection of the runway in use in document 4444 PANS-ATM. With regard to tailwind, it is written that environmental factors like noise abatement should not be the determining factor if the tailwind exceeds five knots.

Let's look at reality. Despite the known risks of operation in tailwind conditions, an increasing number of airports are operating with noise preferential runway configurations. As the 5 knots maximum tailwind is a limiting factor, there have been numerous discussions within ICAO panels to increase the maximum allowed tailwind component for these operations up to 7 or even 10 knots.

This does not mean necessarily that aircraft will overrun the runway. Still, 10 knots of tailwind compared to 10 knots of headwind – using the other direction of the runway – means a total of 20 knots increase in ground speed upon landing. Also, the likelihood of a longer flare will increase with increasing tailwinds. All of this increases the chances of overrunning the end of the runway. Noise restrictions, like forbidding the use of reverse thrust, add further complications.

Irrespective of the winds, there is another step that is taken at many airports to reduce noise. The glide path of the ILS is in some places increased from 3 degrees to 3.2 degrees. Aircraft are now approaching a little steeper, which theoretically reduces noise by a couple of decibels.

Every single step seems manageable, and so it is in many cases. But how might these add up? A steeper and faster approach that increases the chances of unstable approaches. A tailwind on the ground of 10 knots, which means the tailwind at 3000 feet above ground will be around 20 knots. Perhaps the runway is a little wet and reverse thrust is forbidden for noise reduction reasons. Are we still looking at a safe approach?

Each step, each assessment, will not show a significant reduction in safety. But if you combine all the small steps, all the different assessments, and make a large-scale safety assessment, the reduction of flight safety, the trade-off between safety and other goals will manifest quite clearly.

The brake fault

I was once approaching a small regional airport with an Embraer 190 jet. During gear extension my Embraer came up with a 'brake fault' indication. We went around and worked through the related checklists. From the checklists, the landing seemed uneventful and so it was later on.

My first thought was to stay at that airport and see maintenance. Still after consultation with our maintenance office we did some ground checks and decided to return to our hub.

During approach to our hub, the fault came up again. Upon landing the efficiency of our brake was heavily reduced making the landing very interesting. Luckily, nothing happened and we ended up safely at the stand. But why did we return to the hub instead of calling maintenance staff at the airport?

Calling maintenance to the small regional airport would have probably taken a day. The return flight and two other flights would have needed to be cancelled. This, as a consequence of a 'manageable' problem, seemed a little too drastic to my colleague and me.

If the primary goal had been 'safety first', then, of course, we should have accepted all the inconvenience and operational consequences for the airline. We always shift priorities in aviation, which is part of our job. These priorities are cost-effectiveness, on-time performance, safety, passenger comfort, and environmental footprint.

In times of increasing competition between airlines and less favourable market conditions, there is an urgent need to focus more on safety.

I have become more cautious when in flight deck. If the conditions do not seem safe, I simply go-around, regardless of consequences on my schedule, etc. If you are late, you are late. But dying early is more than an inconvenience.

Wolfgang Starke is a Bombardier Dash8-Q400 type-rating examiner. He has recent experience on Boeing 737 and Embraer 190 flying with a regional German airline. He serves various technical committees within German Pilots' Association (Vereinigung Cockpit) and the International Federation of Pilots' Associations (IFALPA). He is a pilot representative to ICAO in the ICAO surveillance panel.

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Handlers Caught in the Headlights

It may seem odd to start an aviation safety article with a motoring analogy but for those of us who drive, it's a situation most of us would have experienced.

We have all at some point uttered the odd choice word to describe our 'disappointment' when an oncoming driver has not dipped their headlights as they pass.

Why? Because we feel this is an inconsiderate act that temporarily compromises our vision and therefore, our personal safety.

In a previous GHOST article, we spoke about the misuse of anti-collision lights during the departure phase and the potential for safety margins to be reduced. Feedback from GHOST members suggests many airlines have revised flight deck procedures and checklists, in addition to ground staff complying with best practice and walking away from the footprint of the aircraft when anti-collision lights are inappropriately switched on. However, the latter positive action may have resulted in an unintended consequence...

There have recently been numerous reports that flight crew have been using the landing, runway turn off and/or taxi lights to attract the attention of their ground handlers. For example:

- While sitting in the tug, ready for the pushback, the flight deck flashed the nose gear lights several times. This was directly into XXX's eyes causing, preventing him from continuing his duties. He was unable to come to work the following day and has been advised to seek medical advice.

- Supervisor and Ramp Agent were connecting the towbar to the aircraft and were flashed by the aircraft landing light three times, while performing their duty. They both claim they have issues with their eyes and have headaches.

- Agent was removing the nose wheel chocks when he was flashed with the main beam lights on the nose wheel by the flight deck. Agent contacted the flight deck to complain and explained that they shouldn't be doing that. The captain was in a rush.

- While servicing the outbound XXX, the captain flashed his nose gear lights whilst XXX was plugging in his headset, temporarily blinding him. When challenged via the headset and asked why he flashed his lights, the captain's response was: *"We are going to miss our slot"*.

The last example reveals the most significant influence for this behaviour. Everyone who works on the frontline (ground crew, flight crew, cabin crew etc.) is working under pressure. As departure time approaches, this pressure builds on the flight crews, who are often waiting only for their ground handlers to complete final actions/ preparations for departure.

In many locations the electronic clock (Ramp Information Display Systems - RIDS) will be prominent in the crew's vision. Whilst informative, it is reminder that time is counting down to their assigned slot. A slot gives the crew a 'Calculated Time of Take Off' (CTOT). Normally, the aircraft should take-off within 15 minutes of the time stated in its flight plan but, if a slot is necessary, this window reduces to within five minutes before or ten minutes after the CTOT. If the aircraft can't achieve this take-off time, the crew must reapply for a slot, which could cause a significant delay.

At this phase of the operation, means of communication are limited and, with the aforementioned pressures ever present, the lines between performance and safety sometimes become blurred.

The latest generation aircraft are fitted with LED lights which are technically safer than the older Halogen versions. However, studies have revealed that exposure to an intense and powerful (LED) light is 'photo-toxic' and can lead to irreversible loss of retinal cells and diminished sharpness of vision.

The problem of extreme light exposure is equally true for ground handling staff. Sudden exposure to bright light, especially at night, can render staff temporarily blind, it is disorientating, and can cause permanent damage because of proximity to the light source. In addition to the normal risk associated with the pushback activity itself, temporary disorientation or loss of vision in and around numerous trip hazards, operational ground support equipment, and potentially even running engines, is extremely dangerous. In addition to nausea, light exposure can cause:

- Flash blindness (a temporary loss of vision produced when retinal light-sensitive pigments are bleached by light more intense than that to which the retina is physiologically adapted at that moment), is a visual impairment that may last for a few seconds to a few minutes. The bright light overwhelms the eye and a bright spot or spots may be seen for many minutes.

- Permanent damage can result in various ongoing complaints, including blurred vision, 'burn patches' on eyes, headaches and depression, all of which often extend beyond the working environment and have an impact on everyday life.

The dangers and distractions arising from dazzle incidents are well known. Laser attacks against aircraft were an increasing problem that eventually resulted in the Misuse of Lasers (Vehicles) Act 2018, which made such attacks an indictable offence and dazzling pilots of aircraft in flight with any form of light is still an offence under the Air Navigation Order (2019).

In the three year period from 2017 - 2020, one GHSP recorded ten incidents related to the incorrect operation of aircraft lights. (It's worth noting that in these cases, the three-year statute of limitation has not yet expired and it is still possible that claims will be pursued by the injured parties)

Of the incidents referred to above, the GHSP received two formal claims which are currently reserved at £103,000. In both cases, the claims made against the GHSP, as the claimant's direct employers, allege that an unsafe system of work and an unsafe place of work was provided. These allegations are equally likely to be made against the airlines, as all organisations involved have a legal duty to ensure staff are safe from injury while at work.

As a side note, their insurers advised they were aware of a number of flashing light claims brought against a major airline. Insurers decided to defend the claims and take the cases to trial on the basis that the injuries sustained were minimal. The cases were heard at a County Court and the trial judge found in favour of all the claimants. Although there was evidence of exaggeration by some of the claimants regarding their symptoms, the trial judge ordered insurers to pay up to £1,000 in respect of each claimant. In more severe eye injuries, as shown by the reserves on the live claims above, the damages where associated with long term absence from work, can be substantially in excess of those awards.

We have been led to believe that at least one airline encourages (with their operations manual) the use of landing and/or turn-off lights to attract the attention of their ground handlers. For the reasons detailed in this article, flight crew are implored to use other means of communication such as radio, interphone, hand signalling, ground horn, etc.

An example of an appropriate operations manual entry is: "Landing or turn-off lights must not be switched on at any time if the crew suspects that the tug is attached to the aircraft or if any person is believed to be in close proximity to the lights, even during daylight, as they can cause severe discomfort and temporary visual impairment".

Summary

The inappropriate use of aircraft lighting as a means of signalling to ground handling staff can cause dazzle, possible eye injury, distraction and disorientation, and hence presents a significant threat to the safety of staff during an activity which is itself risk-bearing. In the interests of best practice for reducing this risk, GHOST and the UKFSC recommend that stakeholders consider the following actions:

Aircraft Operators:

- Conduct a review of your operations manual, to see if the aforementioned issue exists, with a view to amendment.
- Through training and monitoring, ensure that flight crews do not inappropriately use these lights whilst ground crews are conducting final pre-departure preparations.
- Introduce new or promote existing procedures that require flight crews to establish communication with the ground crews, using alternative methods.

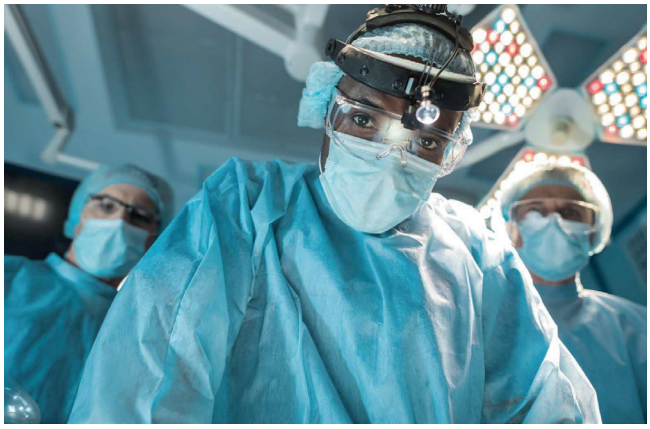
Ground Handling Agents:

- Through training and monitoring, ensure that ground crews walk away from aircraft when taxi lights have been inappropriately used and do not continue with pre-departure preparations, until medical advice has been sought.
- Introduce new or promote existing procedures that require ground crews to establish communication with flight crews, when they intend to be away from the headset, to conduct duties such as the pre-departure safety walk-round.
- Ensure that all related incidents are formally reported.

For any related comments, feedback or information please contact GHOST@caa.co.uk

GHOST
GROUND HANDLING OPERATIONS SAFETY TEAM

A Surgeon's Take on Human and Organisational Factors: A conversation with Manoj Kumar



Healthcare is perhaps the most complex safety-critical sector, and the challenges have only increased throughout the COVID-19 pandemic. Increasingly, human and organisational factors have come under the spotlight. Manoj Kumar is a consultant general surgeon with a background also in safety, human factors, and training. In this conversation with Steven Shorrock, Manoj provides insights and perspectives on the realities of work in healthcare, and the team's role in improvement.

KEY POINTS

- The 'new reality' in healthcare has most elements of the 'old reality', in terms of leadership thinking and organisational culture.
- Those in positions of senior leadership need to be as adaptable and agile in decision making and learning as other professionals.
- Teams can resolve most problems and realise most opportunities, given the time, freedom and resources.
- Team-based quality reviews link reporting directly to regular team discussions, and feed the team's learning back into training and the governance process.
- Focusing only on learning from adverse outcomes or snapshots of work can result in a lot of lost learning.
- Reducing unnecessary bureaucracy can enable horizontal communication and adaptability in an organisation, making it more effective.
- Issues of wellbeing and diversity are now issues of active reflection and discussion..

Steven: *Thanks for making the time to talk, Manoj. I'm wondering how you got into the profession of surgery.*

Manoj: I'm a general surgeon with an interest in benign upper gastrointestinal surgery and abdominal wall hernia. I perhaps came to this profession through a different path to most of my colleagues. I come from a far less privileged background and certainly there were no doctors in my family.

Steven: *How did that influence your work?*

Manoj: Well, when I got my medical degree and started my first job as a junior doctor, the first thing I noticed was that I was in a smaller minority in terms of background, but also in terms of my insight and my perception of this whole career. Then when I joined surgery, you can imagine it became even more evident. Very early in my career, I was also a patient in the NHS [National Health Service], so that also gave me that opportunity to see things differently from some of my colleagues, which I certainly found to be an advantage. I suppose I knew what it was like to be in a vulnerable position and to have anxieties that go beyond passing or failing an exam.

Steven: *And you are also involved in human factors. How did that come about?*

Manoj: I did my masters in the subject in 2009 at Aberdeen University. That again set me off in a slightly different path than most of my colleagues, which was great because this was definitely much needed in healthcare. I eventually got onto this role as the National Clinical Lead for the Scottish Mortality and Morbidity Programme which has since evolved to 'team-based quality reviews'. So my current role is really split between being a consultant surgeon, focussing on elective and emergency work and that of my national role based primarily with NHS Education for Scotland.

Steven: *What are the main challenges and trade-offs that come up for you in working with patients?*

Manoj: I always wish I had more time to spend with the people I meet or see. I think most of us come into this profession knowing that delivering good care and building trust, especially with those who are at their most vulnerable when they meet you, requires spending a reasonable amount of time listening to their concerns, anxieties and hopes. What little time that we have, either on a ward round or in clinics, involves a constant battle between receiving vital information and providing the necessary information. And whether we like to admit it or not, something has to give if more or less time is spent with a patient. More time with a patient will impact on available time for something or someone else, often resulting in less time for ourselves, rest, families, home, etc. Less time spent with a patient can, and unfortunately does from time to time, result in near misses, 'incidents', or indeed harm. It can be difficult to get the balance right.

Steven: *I was about to ask what a typical day looks like, but I'm aware that there probably isn't one and I know you're in surgery today, unexpectedly.*

Manoj: This is where it gets interesting. I was not meant to be in theatre today. It has been a busy morning, having had to take a patient to theatre as my colleague got caught up with another clinical commitment. There's an element of unpredictability in this work. And it happens fairly regularly, especially in the current climate. Most healthcare systems have been designed to run to get the most out of them, with finite resources. So everything has to fall into place on a daily basis. When something doesn't fall in its place, then you see workarounds or tradeoffs, which fortunately often result in a good outcome. But if someone forgets something or something unexpected happens and the right filter is not there to capture this, you can get a poor outcome. Then, it is not uncommon that this can evolve into blame of the person at the sharp end, or worse. Most folks don't realise that 'good' and 'bad' often have the same origin story.

Steven: *So it's kind of running with very little spare capacity and few degrees of freedom. How does the pandemic change things? Is there a new reality for you?*

Manoj: There is certainly a new 'awareness', though in a sense there isn't a new reality as such. You have the same people running the same organisation and perhaps sometimes applying the same thinking to try and resolve a new challenge. Perhaps you will tell me it's the same in other industries. The National Health Service is the best thing we have in Scotland and the UK, and it's an amazing resource that we should all be so proud of and it can and will continue to improve. We do have to be aware that Sometimes the the culture can be ingrained with the same thinking or traditions that can hamper progress.

Steven: *Are you talking about leadership?*

Manoj: Yes, in part. There is always that risk of being trapped in an echo chamber where individuals may inadvertently surround themselves with like-minded folks who are likely to resist challenging the status quo. And sometimes, it is easier to get onto that ladder to these leadership posts if you fit that description. It can result in a rather exclusive club that naturally becomes detached from the 'messy reality' that you have written about previously. Those outside that exclusive circle may struggle to get a seat at that table – never mind get their voices heard – and those who do challenge may be viewed as a troublemaker or be 'spoken to'.

Most in leadership roles are well-intentioned individuals trying to do the right thing. But it's that issue of applying 20th century thinking that "this is what worked or did not work for us before" to resolve current complex challenges. We should reflect on past experiences but that should not paralyse our ability to take on new challenges.

I think 'leadership' is sometimes overhyped to the point where we see significant resources being spent on leadership programmes, etc. This, once again, is focussed on the few. And we are sometimes still left with commandand- control thinking.

Steven: *Can you give us an example?*

Manoj: Early in the pandemic, I noticed one hospital that came up with this concept of 'gold', 'silver' and 'bronze' leadership levels. And there would be emails noting that silver leadership has asked bonze leadership to do something. In a way, it made some of the staff ask where their position was – seat 38A at the back of economy class?

You can see the thinking: good individuals trying to do good things but with perhaps a misguided sense of what leadership is about. It perhaps can be described as this heavy-loaded goods train going on this one track, and you can get on it and get to where they think you should go, or you get off. But the reality is, things still function on the ground level.

Steven: *So on the ground level, where do staff come into this in healthcare?*

Manoj: You have this brilliant group of people who regularly go beyond reasonable expectations to make a significant positive contribution to their workplace and care that is offered. We have to be conscious that some of these brilliant people do get left behind, sometimes because they are not given the opportunities to progress for unfortunate reasons and biases. Or they are viewed as 'difficult' because they have challenged the status quo. They naturally become withdrawn and disengage. And so you do lose that diversity in thought amongst other things.

I have always believed that the focus of any organisation should be on teams – that collective will or sense of shared purpose. This is what we should be investing in. Give people the opportunity to get together and figure things out themselves and support them with the required resources and time to resolve these challenges.

And that's what we've seen in the pandemic. It was those teams working day in, day out – cleaners, nurses, porters, doctors, and so on, working collaboratively under intense pressures – actually making a real difference, and they could do that because they were able to support each other, adapt and overcome problems. We have seen some countries that continue to be amazing because of the people, and not because of the leaders, at times. It can be similar in organisations.

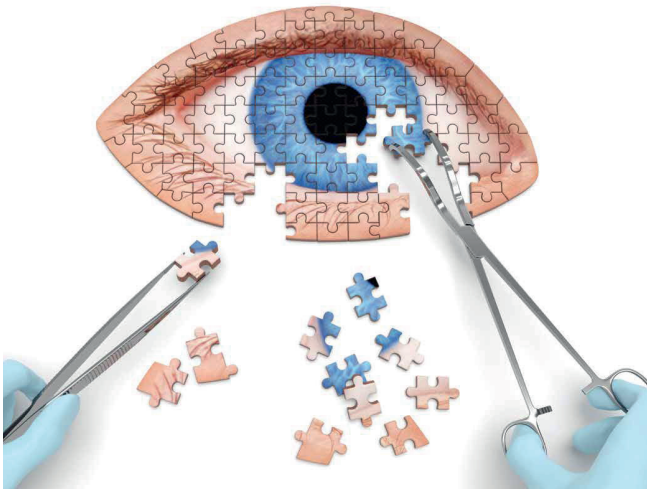
Steven: *You mentioned earlier about the heavy goods train metaphor for leadership and culture. How do you personally respond to that? Do you choose to get on the train and try to switch it to another direction, or do you stay on the sidelines?*

Manoj: That's interesting. The reality is it's so complex that it's a bit of both. Soon enough, you realise the wins that you can make. The key things that helped us are clearly articulating the 'why', showing there is a problem, and trying to demonstrate the pathway to how we can actually get there. This is why I'm so focused on these teambased quality reviews.

Steven: *Can you tell me a bit more about the team-based quality reviews? What's the thinking behind them?*

Manoj: In the health service, there is a reactive approach to 'harm', which is to wait for a tragic event and then spend a huge amount of time and money on reviews trying to understand what went wrong. And these reviews may be led by individuals in senior positions who may not necessarily have had the support or training in concepts of human factors. There is also the added challenge of what 'safety' actually means to different people in different roles. And these reviews are often conducted with little input from those who were involved in the event, such as next of kin or the team delivering care. So there is that significant risk that the output of these reviews may be incomplete delayed, or, worse still, flawed. And their recommendations can have little impact in preventing another 'event'.

If we can support people to get together to sit regularly and participate in a somewhat structured social process of inquiry to ask those questions, then we are on a start towards improvement. This means listening to patients' and carers' perspectives in these discussions.



One of the other things that is evident in review processes in healthcare services, perhaps more so in the NHS, is that they can be outcome-driven. We often look at a single snapshot in what is essentially a complex journey for the patient. The reality is that not all people who die in hospitals have had poor care, while there is a significant number of people who don't die, but did have poor care. So, if we just focus on deaths, we're missing a huge amount of learning and areas that require improvement, which if addressed in a timely manner could potentially prevent such terminal events. We need to expand the review processes.

Steven: *What you do in the team-based quality review? What is the process?*

Manoj: Essentially, a team-based quality review is about having an informed workforce that have the time, tools and training to come together regularly and look at what has gone well and not so well in the care they provide. A significant element is bringing in the patients, families and staff perspectives into these reviews. The process starts with having the right systems in place to capture relevant information. Specifically, this is a reporting or learning system that can be accessed and used easily, but also one that can function as a learning resource. This information is then shared with the team who can use appropriate tools or frameworks that are grounded in HF principles to carry out the required analysis of why things worked well or why they did not. Traditionally in healthcare, whether we acknowledge this or not, reporting has been used to blame people. We are seeking to change that.

We saw an improvement in engagement and more openness in reporting when people understand the purpose of reporting, the benefits of a 'systems' approach to analysis, and work collectively as a team to find solutions to complex challenges. And this feeds back to the organisation's governance process, to those who are ultimately accountable to ensure relevant changes are made or teams supported.

Steven: *So, instead of the data going into a black hole where you don't see it again, it comes back to you in a sense.*

Manoj: Exactly. There are, of course, challenges, including how do we change the perception that reporting systems are synonymous with punitive repercussions. We need to change this thinking of reporting of adverse events as negative and reporting of 'excellence' as positive. The reality is that both are positive measures to help us improve the care we can offer. If we create a safe space and have right tools, right structure, right systems and processes, people actually speak up. And in complex systems, you need this to happen regularly in a manner that results in timely positive change. Otherwise, we will continue on this never-ending journey of waiting for something catastrophic to happen before we initiate expensive reviews and decide on change.

Steven: *You've heard, of course, about all of the ways in which aviation could benefit healthcare. I'm keen to hear about the reverse – what front line operational staff in aviation and elsewhere can learn from healthcare. So that's one example. Do you have any other examples of practices individually, as a team or as an organisation?*

Manoj: One thing is that in NHS Scotland, we can call anyone from any speciality, in any hospital, and get their help without any significant barriers. Yes, there may be disagreements on the specifics of management plans, but this is good because it allows everyone to give our patients the best management plan possible. Whether it's specific patient care or helping with training or reviewing organisations systems or processes, there's a great spirit of cooperation.

Steven: *On the pandemic, have any key lessons emerged, in terms of how it was before and how it is now...perhaps any changes you'd like to keep?*

Manoj: There was, and perhaps still is, this situation that, if a wrong decision was made, it was on one healthcare professional alone. There was little understanding of the complexities behind decision-making, especially in healthcare. I think there is a greater recognition of the complexities that we all work in, why decisions make sense at a particular time and more and more you see an interest in understanding of human factors science and its significant relevance.

One other thing that the pandemic has forced us to look at closer is on wellbeing, especially stress, burnout, and dissatisfaction. People sometimes forget that those working in the health service also have lives outside of work and they have challenges like everyone else.

In the last year or so, we have also seen an increased awareness of issues around diversity. It may not be obvious to some, but this is also a significant safety issue.

These problems and challenges were always in existence and will perhaps continue to be there. But, interestingly enough, the pandemic has forced most of us to pause and reflect, and because now there's more conversation on wellbeing, people are at least talking and continuing to raise awareness about it. And we are seeing changes, thanks to the masses who are pushing for change. I think people are looking within their teams and at themselves, asking, "how can we be better?"

Steven: *You mentioned wellbeing and stress. Many are suffering in different ways. What kinds of things do you do to manage your own wellbeing? What kind of self-care strategies do you have?*

Manoj: That's a really good question. We asked ourselves this recently and a lot of us, me included, fall into this trap: you work and you go home. Unfortunately, the pandemic didn't really shift much of that routine for those working in health and social care. I don't play golf like most of my peers do. I've got two young girls of eight and ten years old. And if you ask me what keeps me sane and grounded, it's them. We go on bike rides, walk and really enjoy doing those kinds of things. That's what keeps me sane. It's family.

Manoj Kumar is a Consultant General Surgeon and Associate Director of Medical Education at Aberdeen Royal Infirmary. He is an Honorary Senior Lecturer at the University of Aberdeen, Hon Clinical Tutor at University of Edinburgh and Fellow of the Royal College of Surgeons of Edinburgh. He has completed a Master's degree in Patient Safety: A Human Factors Approach from the University of Aberdeen as well as the Scottish Quality and Safety Fellowship. He is the National Clinical Lead for Team Based Quality Review Programme with NHS Education Scotland which aims to improve safety reviews and processes in health and social care. He is also a committee member of the Law Society of Scotland's Health and Medical Law Subcommittee and an ambassador for the Clinical Human Factors Group.

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