



Submission to Parliamentary Joint Committee on Law Enforcement: Inquiry into COVID-vaccine related fraud and security risks

**CENTRE FOR SUPPLY CHAIN
AND LOGISTICS, AND CENTRE FOR
CYBER SECURITY RESEARCH AND
INNOVATION**

**A SUBMISSION PREPARED FOR THE PARLIAMENTARY
JOINT COMMITTEE ON LAW ENFORCEMENT**

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The Centre for Supply Chain and Logistics at Deakin University is Australia's leading research centre focusing on freight logistics and value-added supply chains. We aim to optimise public and private sector decision-making to achieve a better and more sustainable future.

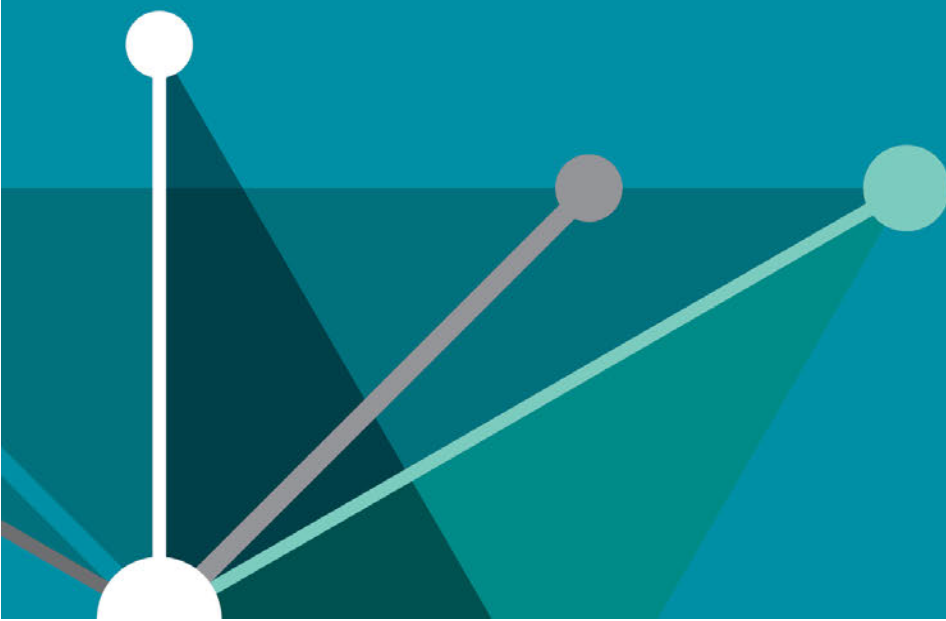
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1. Introduction

On 17 March 2021, the Parliamentary Joint Committee on Law Enforcement commenced an Inquiry into COVID-vaccine related fraud and security risks. The issues covered in the Inquiry range from fraud and integrity risks relating to COVID vaccinations, to the supply of fake vaccines, black market vaccines and/or fake vaccine certifications.

As the pharmaceutical and health care sectors are increasingly digitised, cyber security incidents are becoming more common, from attempts to steal data and intellectual property, to preventing relevant computers or networks from operating. Commonwealth Government has warned of cyber attackers taking advantage of the coronavirus pandemic to try to hack the computer systems of hospitals, medical services and crisis-response organisations ¹.

The health-care sector has been a major target area for cyber attackers in recent years. IBM cyber security analysts have recently uncovered an email phishing scheme targeting global coronavirus vaccine supply chains ². A recent INTERPOL 'Orange Notice' has outlined potential criminal activity in relation to the falsification, theft and illegal advertising of COVID vaccines, with the pandemic having already triggered unprecedented opportunistic and predatory criminal behaviour. It also includes examples of crimes where individuals have been advertising, selling and administering fake vaccines ³.

Given this background, the focus of Deakin University's Centre for Supply Chain and Logistics (CSCL) and Cyber Security Research and Innovation (CSRI) Submission to the Parliamentary Joint Committee on Law Enforcement is on the issues related to managing the risks regarding fraud and integrity of the COVID vaccines, particularly with respect to traceability along its supply chains. Additional aspects relating to misinformation and criminal activity which would negatively impact vaccine distribution and confidence in community uptake are also addressed.

2. COVID vaccine supply chain: some risks and integrity issues

Many supply chains, including pharmaceuticals, can be vulnerable to counterfeiting, tampering, contamination and theft — especially as products and components often passthrough multiple locations and countries, and different tiers of firms/entities along the supply chain. Consequently, provenance and authenticity of pharmaceutical products such as the COVID vaccines are critical to assure end users of the vaccines' safety and efficacy.

¹ <https://www1.racgp.org.au/newsgp/professional/health-sector-remains-biggest-reporter-of-data-bre>

² <https://securityintelligence.com/posts/ibm-uncovers-global-phishing-covid-19-vaccine-cold-chain/>

³ <https://www.interpol.int/en/News-and-Events/News/2020/INTERPOL-warns-of-organized-crime-threat-to-COVID-19-vaccines>

The complex global supply chain for vaccines extends from the raw materials for vaccine manufacturing and the factories in one country to distribution centres and the arms of patients in another. It creates considerable pressure on the health care sector, IT systems, and the relevant logistics providers who play a critical role along the supply chain. It has been reported that pursuing an increased focus in tracking and tracing i.e. traceability along the vaccine supply chains has been regarded important by nearly 80 percent of vaccine manufacturers in general ⁴. Hence, it is important to recognise that, at least the large pharmaceutical companies involved in the production of COVID vaccines are no stranger to safety and security risks and cyber-espionage. But the issues around the COVID pandemic have changed the vaccine supply chain's importance and significance, given the 'large scale nature' of the activity ⁵. Furthermore, the large-scale nature of distribution of the various COVID vaccines across wider geographical locations brings with it major challenges relating to risks and security regarding fraud and integrity of the vaccines. Hence, addressing risks and integrity issues along the COVID vaccine supply chain is critical to assure the users of the vaccines' safety and efficacy.

3. Tracking and tracing (traceability) along the COVID supply chain

Pharmaceutical companies, upstream suppliers, associated logistics providers, health workers, regulatory agencies, public health experts and ultimately the medical practitioners and general public have been exposed to an increasingly globalized vaccine supply chain. Disruptions to the supply chain due to any risks relating to the provenance, authenticity and integrity of the vaccines may cause cascading failure and have devastating consequences.

It has been observed that the COVID pandemic has already highlighted the lack of resilience in many supply chains, as supply chain networks fail from disruptions at single nodes and connections. As the production, distribution and use of COVID vaccines continue, the importance of not only an efficient supply chain but a resilient vaccine supply chain capable of reliable production and reaching target populations is imperative. In this regard, proactively tracking and tracing along the vaccine supply chains will increase the probability that vaccination programs meet their goals. Without an efficient tracking and tracing in place for manufacture and distribution of the COVID vaccines, even the most effective and safe vaccine may not prove viable ⁶.

It is important to recognise and address the challenges related to the robustness and resiliency of COVID supply chain networks. In this regard, it is critical to identify along the vaccine supply chain where potential points-of-failure may arise (for example, at critical tracking events that relate to the development and delivery of the vaccine) that may degrade or even destroy supply chain capacity for successful vaccine development and delivery. In this context the key data elements along the vaccine supply chain provide information related to the who, when, what, where and why of a critical tracking event along the chain.

⁴ <https://www.sciencedirect.com/science/article/pii/S2590136220300152>

⁵ <https://www.bbc.com/news/technology-55411830>

⁶ <https://arxiv.org/abs/2011.14231>

For example, in this process of tracking and tracing along the vaccine supply chain, batches of vaccines should be serialized for easy identification, with proof of pick-up and delivery confirmed via an authenticated chain of custody, reported through digital supply chain management systems (DSCMS) such as smart IoT devices and applications (see Box). This highlights the importance of using product traceability tools in tracking and tracing. In this regard it is noteworthy that Deakin University is currently finalising *Australian Guide to Implementation of Food Traceability* (AGIFT).⁷ Even though this guide has as its main focus the traceability of food, it could serve as a reference for traceability in pharmaceuticals such as the vaccines.

Complete, end-to-end inventory visibility is vital to understand when vaccines will be available for use, and to avoid damage or theft. Data on tags from COVID vaccine batches enable efficient tracking, giving supply chain stakeholders a complete picture of the volumes stored or in transit, as well as any vaccines delivered but not yet used. Stocks can also be identified according to the manufacturer and expiry date — which is important, given the relatively short shelf life.

Box: Benefits of digital technologies in COVID vaccine traceability

The World Bank points out that digital supply chain management systems (DSCMS) can offer a series of benefits and support the supply chains for COVID vaccines ⁸:

- **Visibility:** the integration of data from all stakeholders improves visibility and coordination.
- **Accuracy:** the proliferation of devices that produce real-time granular data allows for accurate monitoring and interventions.
- **Responsiveness:** visibility and accuracy enable responsiveness against disruptions.
- **Productivity:** the availability of digital data and computational power enables the automation of processes and continuous optimisation of resources.
- **Sustainability:** the transition to paperless procedures and the optimal use of resources yields substantive environmental benefits.
- **Security:** in coordination with cybersecurity strategies, digital technologies enable secure data-sharing and hinder tampering (counterfeiting, theft, and illegal diversion of vaccines) along the supply chain. Given the high levels of sensitive information that will be stored and shared through this system, it is essential to have a strong cybersecurity layer protecting its integrity and confidentiality.
- **Integrity:** temperature integrity of the vaccine can be tracked in real-time to detect and rectify any issues.

Also, the tracking and tracing tasks should help detect any anomalies including counterfeits and send alerts — visible to all key supply chain stakeholders — and be able to trace the source of any unauthorised intervention along the vaccine supply chains. By sourcing vaccines only from reputable providers who are properly accredited, by verifying that they have a valid and well documented

⁷ <https://foodtraceability.deakin.edu.au/>

⁸ <https://blogs.worldbank.org/transport/digital-technologies-will-support-supply-chains-covid-19-vaccines-and-medical-goods>

chain of custody record for the vaccines being provided and verifying that the vials being supplied match with that record, for example in terms of unique non-reusable serial numbers, we can reduce the risk that counterfeits make their way into the supply chain. Ideally medical staff at the final end of the supply chain should be able to verify, through an easy process, the authenticity of the vials they are administering to patients. Additional technology solutions leveraging blockchains for traceability and record management are alternative solutions which can be utilised. In addition, the use of non-reusable serial numbers in the form of a QR code could be used by medical staff in the field to authenticate the validity of vaccine ampoules using an ordinary mobile phone with an appropriate application.

Last but not least, there will need to be a way to track and trace who has received a COVID vaccine, which will be especially critical if efficacy requires two doses. In this context, as with any health tracking policies, health privacy issues would need to be addressed ⁹.

4. Misinformation, fraud and criminal activity

It is highly likely that cyber criminals and hostile foreign nations will utilise any failures, disruptions or negative aspects of the Australian vaccine rollout with the intent of monetising the opportunity (e.g. selling fake vaccines due to government deployment delays) or, in a worse case, to cause political and economic disruption to Australia. While vaccines are critical to the recovery of Australia and our key path to normality post COVID-19, the way vaccines work¹⁰ and the minimal risks associated have not been clearly understood by the general public and extra effort should be undertaken by governments at all levels to educate the public to reduce the spread of misinformation.

This also requires the federal government enforcing some level of accountability among social media providers (e.g. Twitter and Facebook) to remove accounts of individuals and organisations promoting COVID-19 vaccine misinformation. A level of accountability also needs to be accepted by the media to prevent the sensationalism of vaccine related deaths of individuals (e.g. blood clots) or the spread of COVID-19 by vaccinated individuals.

Any negative aspects of the vaccine deployment will be easily manipulated, propagated and amplified on social media platforms increasing the number of Australians who refuse to be vaccinated, often on false beliefs.

⁹ <https://arxiv.org/abs/2011.14231>

¹⁰ <https://www.who.int/news-room/feature-stories/detail/how-do-vaccines-work>

5. Concluding remarks

Ensuring end-to-end traceability along COVID vaccine supply chains can help manage the risks regarding fraud and integrity of the vaccines. Use of effective traceability frameworks and tools along the COVID vaccine supply chains is critical given the 'large scale nature' of the vaccine manufacturing activity, and the extensive distribution of the vaccines across wider geographical locations.

Traceability frameworks and tools have the ability to provide information related to the who, when, what, where and why of a critical tracking events along the various COVID vaccine supply chains. This enables the identification of potential points-of-failure including major risks and integrity issues relating to the development and delivery of COVID vaccines.

Hence, addressing any risks and integrity issues along the COVID vaccine supply chains using robust traceability frameworks and tools, combined with public education on how vaccines work is critical to assure the users of the vaccines' safety, efficacy and uptake.



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