researcher at the University of Oxford, UK, who has been involved with clinical trials of Ebola treatments.

Similar concerns arose during the severe acute respiratory syndrome outbreak of 2003–04 and the 2009 H1N1 flu pandemic; after both events, researchers drafted study designs that could speed up future trials in outbreaks caused by respiratory pathogens. But there has not been a similar effort to coordinate trials for haemorrhagic diseases such as Ebola, which are less likely to spread to wealthy nations.

The WHO framework aims to boost readiness to conduct trials for diseases that could cause global health emergencies. Although it has not been decided which diseases will qualify, Lassa fever, Rift Valley fever and Middle East respiratory syndrome are candidates.

DIFFERENT PRIORITIES

The delays in developing trials of Ebola treatments, researchers say, were due to a disconnect between organizations caring for patients and those leading the trials; refusals to share data; and failures to perform the efficacy and safety tests that could have been done before the outbreak (see *Nature* **511,** 520; 2014).

"We need to do the phase I studies in humans and have a small stockpile rather than stop at the animal stage," says England's chief medical officer Sally Davies.

Trials also lagged because of disagreements over logistics and ethics. For example, after the medical aid group Médecins Sans Frontières (Doctors without Borders) and researchers at the University of Oxford organized trials of the drug brincidofovir that did not include placebo groups, the US Food and Drug Administration pushed for randomized trials that would include untreated controls. The brincidofovir trial eventually went forward without a control group.

Data-sharing roadblocks have also occurred at all levels. The experimental drug ZMapp was given to a handful of patients before supplies ran out in August 2014. But detailed information on the patients' reactions to the drug has not been released, owing to fears that this would prevent researchers from publishing on the cases. Similarly, pharmaceuticals firm Chimerix of Durham, North Carolina, would not publicly reveal why it withdrew support for a trial of brincidofovir in late January after four patients had been treated, but Kieny says that the decision was due to the drug's lack of efficacy.

At a broader scale, the WHO cannot publicly release comprehensive epidemiological information because the data are owned by countries where cases occur.

Kieny is trying to persuade publishers to agree that researchers can release analyses of patient and laboratory data during health emergencies without compromising their ability to publish on it. She is also trying to broker an agreement with funding agencies that data from publicly funded safety and efficacy trials in outbreaks must be made widely available. ■

YURI BELINSKY/ITAR-TASS/CORBIS

Paolo Macchiarini has misrepresented data on the success of artificial-trachea transplants, says a report.

SYNTHETIC WINDPIPES

Surgeon commits misconduct

Papers authored by Paolo Macchiarini misrepresented success of pioneering tracheal transplant procedure.

BY DAVID CYRANOSKI

A surgeon famed for his pioneering transplants of synthetic windpipes has committed scientific misconduct, according to an independent investigation.

Six published papers authored by thoracic surgeon Paolo Macchiarini, a visiting professor at the Karolinska Institute in Stockholm, had misrepresented data from recipients of the artificial windpipes, or tracheas, reports Bengt Gerdin, a general surgeon and professor emeritus at Uppsala University in Sweden. The papers made the operation sound more successful than it was, says Gerdin, who was commissioned by the prestigious Karolinska Institute to examine Macchiarini's clinical procedures.

Gerdin also found that two of the papers[1,2] described operations that had not received the necessary ethical approval, and that a seventh paper[3] authored by Macchiarini, reporting transplants of artificial oesophagi into rats, had misrepresented results.

Macchiarini told *Nature* that he would not comment on the investigation report, which is in Swedish, until he had seen an English version. In November 2014, he told *Nature* that he welcomed the investigation and was confident that "there is nothing suspect, unethical, inflated or misleading about anything I have done or reported". He has two weeks to formally respond to Gerdin's report.

His research had been hailed as a bright spot for regenerative medicine, which has been slow to deliver synthetic materials to replace natural organs. Macchiarini's procedure involved bathing a polymer trachea in stem cells from the transplant recipient's bone marrow. The idea was that when this was used to replace a damaged trachea, the cells would form the right type of tissue and create a seal with the surroundings.

Macchiarini has put such artificial tracheas into eight people. The papers under investigation relate to just three of the procedures, and report that there were some signs that the synthetic tracheas had successfully integrated. Two of those transplant recipients

have died; one entered intensive care after the procedure and is still there. Macchiarini has previously told *Nature* that the problems faced by the patients were unrelated to the transplants.

The investigation began after four Karolinska physicians who were involved in the care of those three patients filed complaints. Karl-Henrik Grinnemo, Matthias Corbascio, Thomas Fux and Oscar Simonson provided medical records that they alleged to be at odds with the published results, and called into question the paper on the rat model.

In compiling the report, Gerdin says, he tried to avoid matters of interpretation that would become "a quarrel between scientists", and stuck to facts such as whether the medical records showed evidence of a follow-up at the intervals claimed. In some instances, publications claimed improvement even though there was no evidence that the patients had been examined. "This is falsification," says Gerdin. Speaking of Macchiarini, he adds: "The basic rule in science is to have all reports documented, but he doesn't have them." The rat-model paper included weight-gain and computed-tomography (CT) data that had been misinterpreted to suggest that the oesophageal graft was more successful than it was, says Gerdin.

He concludes that the misrepresentations were deliberate: "If there is a mistake once, you might think it is random. If it happens several times, you begin to question whether it really is random."

The investigation focused on Macchiarini, but Gerdin notes that Grinnemo, Corbascio and Simonson were co-authors of one of the papers[2] included in the investigation involving a patient, and that Grinnemo was also a co-author of a second[1]. "I'm not saying they share the responsibility, but one has to ask what they knew and what they didn't know," says Gerdin.

"The basic rule in science is to have all reports documented, but he doesn't have them."

The three physicians did not respond to a request for comment, but Corbascio had previously told *Nature* that he was involved only "at a superficial level" with the transplant recipient. "I had complete confidence in Macchiarini," he said.

Separately, on 9 April, the Swedish Medical Products Agency (MPA) filed a complaint with the Swedish state prosecutor over whether proper permission was obtained to carry out the three synthetic tracheal transplants that feature in Gerdin's investigation. The operations took place at the Karolinska. Ann Marie Janson Lang, a clinical assessor in the clinical-trials department of the MPA, says that the synthetic tracheas meet the definition of an "advanced therapy medicinal product", which requires agency permission before it can be given to patients, but that no application for a permit was made.

It is not clear who would bear responsibility for the breach, if it is confirmed. Macchiarini told *Nature* that, as a visiting professor at the Karolinska, "it was never my responsibility to obtain any necessary permissions. I was not directed to do so, nor did I have the authority to do so." As *Nature* went to press, a Karolinska spokesperson said that the institute was preparing to post on its website "the facts about the three operations that Macchiarini performed and other matters connected to that case". The state prosecutor is expected to report back within weeks. ■

1. *Lancet* **378,** 1997–2004 (2011).
2. *Biomaterials* **34,** 4057–4067 (2013).
3. *Nature Commun.* **5,** 3562 (2014).

CORRECTION

The map in the News Feature 'India by the numbers' (*Nature* **521,** 142–143; 2015) omitted the province of Meghalaya. The full map can be seen at go.nature.com/h2ydqb.