

“Something we must be proud of”: An interview and document study of team improvisation in the Dutch convalescent plasma project group

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Funding information

Stichting Sanquin Bloedvoorziening, Grant/Award Number: PPOC-L2245

Abstract

Background and Aims: The COVID-19 pandemic has revealed the importance of organizational resilience, the ability to effectively respond to a disruptive event before, during, and after it occurs. Team improvisation is an important component of organizational resilience as it describes characteristics of team skills and contextual qualities to create order from chaos. In Spring 2020, the Dutch national blood bank, began the convalescent plasma project (CCP). We aimed to study which elements of team improvisation in the CCP group were found and how lessons learned can contribute towards a non-crisis situation for blood establishments.

Methods: Using Vera and Crossan's framework of improvisation, semi-structured interviews with eight members of the CCP group were conducted. This was simultaneous to performing a document analysis of 21 Intranet posts and seven internal reports. MAXDA 2020 was used to conduct deductive and inductive thematic analyses.

Results: The CCP group showed strong characteristics of expertise and memory, teamwork quality, experimental culture, and real-time information and communication that enabled them to improvise in all aspects of the donation process. Improvisation examples included comprehensive communication methods to identify and obtain new donors, asking additional intake questions and collecting additional aliquots to store while waiting for an internal antibody test to be developed, and regulatory respondents allowing a flexible change control procedure to meet the pace of the crisis. Training was evident to a lesser degree.

Conclusion: While improvisation impacted set routines and procedures, the safety and quality of the product were not affected. Regarding organizational resilience, our results showed that the CCP group “coped” well using elements of team improvisation. Blood establishments may consider introducing improvisational training and innovation teams throughout the organization for future preparedness and improving organizational resilience.

KEYWORDS

convalescent plasma, healthcare management and organization, resilience, team improvisation, transfusion medicine (general)

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1 | INTRODUCTION

Since 2020, the ongoing COVID-19 pandemic has profoundly impacted societies around the world, affecting health organizations who have borne the burden of caring for the ill.¹ Blood establishments (BEs) worldwide have grappled to respond to subsequent impacts and changes to blood supply and demand, shortages of materials and staffing, and other issues in the supply chain.²⁻⁶ In organizational and crisis management literature, “the ability of organizations to respond to external threats, such as COVID-19, is linked to the notion of resilience,”⁷ of which improvisation is considered a key component.⁸ Organizational improvisation (OI) is the “conception of unhindered action as it unfolds, by an organization or its members, often (yet not exclusively) in response to an unexpected interruption or change of activity” (p. 4).⁹ In times of crises, it has been described as using creativity to “create order from chaos”¹⁰ and requires “immediate action that cannot be addressed using preapproved, ‘safe’ routines and solutions” (p. 4).⁹

Within BE organization and management, the quality of blood products, particularly aspects of safety and availability, are of paramount importance. This has historically led to a strict system of processes and procedures, and a well-defined organization, staff, and culture of how things are done. However, the COVID-19 crisis challenged these elements as it forced staff to produce a new product in sufficient quantities in a rapid timeframe. Improvisation needed to occur. This is exemplified by the collection of convalescent plasma (CCP), plasma taken from recovered COVID-19 patients to use as a treatment option for diseased patients.¹¹ In 2020, this initiative was catalyzed by many BEs worldwide,^{3,5,6,12} including at Sanquin Blood Supply Foundation, the Dutch national blood bank legally tasked as the sole provider of blood products in the Netherlands. Sanquin rapidly sprang to action in March 2020 to first form the early-stage CCP group to collect CCP for clinical studies, and later, as part of nationwide collection effort for hyperimmunoglobulins.²

Based on our previous work, we found that disruptive events (including a global pandemic) are an important theme that would impact blood product demand so that BEs should become more adaptive, flexible, and be open to change.¹³ These elements are important in resilience, and the pandemic was the perfect opportunity to study these elements in action through the singular and collective actions of the teams that undertook COVID-19 activities. Due to the CCP project being one of the first and most spotlighted projects in the organization,² it was a unique opportunity to study team improvisation within this group. To our knowledge, while there now exists many examples of CCP projects within the literature, there have not yet been case studies on the internal dynamics of such projects, and/or studies on team improvisation in blood banking/Transfusion Medicine during a crisis. Therefore, as part of a broader study on how the COVID-19 pandemic has created an opportunity window for Sanquin to be impacted and change during a crisis, this case study evaluates which elements of team improvisation in the early-stage CCP group were found and how lessons learned can contribute for the noncrisis situation.

2 | MATERIALS AND METHODS

2.1 | Theoretical frameworks on resilience and organizational improvisation

Resilience is a meta-capability of an organization to effectively respond to a disruptive event before, during, and after it occurs. Resilience combines the abilities to anticipate potential threats and be prepared; effectively cope, as well as adapt or learn.^{14,15} Therefore, organizational resilience is both a dynamic process and the set of an organization's capabilities and routines. The second stage of “coping” occurs during the disruptive event and requires (1) accepting the situation at hand and all of its uncertainties and (2) developing and implementing solutions using social resources as part of cognitive and behavioral actions (e.g., improvisation).¹⁴ Therefore, improvisation is part of resilience.⁸

Improvisation is an adaptation method taken from the arts that provide insights and techniques of how individuals can work together in organizations, the process of “attempt[ing] to orient themselves to, and take creative action in, situations or events that are complex, ambiguous, and ill defined”.^{16,17} Improvisation is an intentional, conscious choice and is “the spontaneous and creative process of attempting to achieve an objective in a new way.”¹⁶ When combined with effective team and contextual moderating factors, improvisation can positively contribute towards organizational change.¹⁶ Thus, Vera and Crossan identify two team skills and four contextual qualities needed for effective team improvisation (Table 1).

2.2 | Semi-structured interviews

Semi-structured interviews were held with members of the project group who participated in the early-stage CCP group from March to May 2020. If they agreed to participate, each interview lasted 30–60 min, and was done face-to-face, over the phone, or over a virtual platform. Respondents gave informed consent before being interviewed along with verbal consent for recording. Eight respondents were interviewed at which point saturation was reached. Three of the respondents were interviewed twice due to time constraints in the first interview. An interview guide was created in accordance with the research aims and included three main sections on the role/function of the respondent, details on their specific contribution(s) to the CCP project, and recommendations/lessons learned. However, a semi-structured approach was adopted to allow for a conversational flow and use additional probing as needed.¹⁸

2.3 | Document analysis

Simultaneous to the interviews, and to triangulate interview findings, a document analysis was done in two ways: interview respondents volunteered documents that came out of the project or were used during that time and an analysis of Sanquin's Intranet posts from

TABLE 1 Vera and Crossan's elements of effective team improvisation.¹³

Improvisational element	Definition
Team skills	
Expertise	The specialized skills and knowledge that individuals bring to the team's task that is domain-relevant and task-related skills. The combination of these diverse skills allows for more alternatives in developing combinations of ideas
Teamwork quality	Having healthy team relationships and dynamics that create strong interdependencies; built on trust, a common goal, shared responsibility, common vocabulary, and rotational leadership (ability to lead and to follow)
Contextual qualities	
Experimental culture "Agree, accept, and add"	Having a context that provides room for experimentation, support for risk taking and is tolerant of errors to enable members to be innovative
Real-time information and communication "Be present in the moment"	The ability to be attentive ("present") and alert in the present moment. Current, updated information regarding an organization's operations or environments where there is little or no time lag between occurrence and reporting to allow for timely interaction and open communication within and between teams
Memory	"Draw on reincorporation and ready-mades" Being able to remember and reincorporate what has already been introduced in the past to create something creative and spontaneous in the present
Training	The understanding and practice of using improvisational techniques to increase the ability of the individuals and teams to improvise well and increase their motivation to rely more on spontaneous and creative actions, when required by the situation

March to July 2020 regarding the CCP project was reviewed. Intranet refers to Sanquin's private communication and networking system, in which posts appeared as short announcements/articles for employees.

2.4 | Analysis of interviews

All interviews were recorded except for one due to technological failure. Interview notes were kept for all. Recorded interviews were transcribed verbatim and coded using qualitative software MAXQDA 2020 (VERBI Software GmbH). First-cycle coding followed a predetermined coding scheme based on Vera and Crossan's

framework.¹⁸ Author PLS and a trained qualitative researcher first assessed two transcripts independently. They came together to discuss coding differences to the point of consensus and adjusted the coding framework. PLS continued coding the rest of the transcripts, allowing for inductive themes to arise from the text. A codebook was developed with the final themes and categories (see Appendix I). To enhance trustworthiness of the analysis, member checking with respondents was done throughout the process.

2.5 | Analysis of documents

Qualtrics XM, a survey platform, was used to assess short Intranet posts by categorizing them by the date it was posted, which department(s) were mentioned, and which initiative(s) were mentioned. However, for longer reports or internal documents that were given by the respondents, MAXQDA was used to code them as previously mentioned.

3 | RESULTS

3.1 | Descriptives

The original CCP group had 10 members, of which eight were interviewed. The roles of the eight persons were one donor physicians, one head of donor collections, two Transfusion Medicine specialists, two Quality Assurance specialists, one preparations/productions assistant, and one head of delivery and logistics. These individuals represented every department from the Blood Bank. Respondents were mostly female (five/eight), with the majority (seven/eight) having had 20+ years of experience in their roles at Sanquin (from 20 to 39 years) with an average of 29 years. Furthermore, 21 Sanquin Intranet posts about CCP were found and seven internal reports were shared from the group.

The following results are structured first by providing the contextual background of the CCP group, then, in accordance with Vera and Crossan's framework, assessing the elements of team skills followed by contextual elements for effective team improvisation. Direct quotations are taken from interview respondents. Tables 2 and 3 provide examples of improvisation. Table 2 provides examples specific to a donation step, while Table 3 provides descriptions and examples within the improvisational theme (see Appendix I for the final codebook).

3.1.1 | Case description: Presentation of the background, challenges, and crisis elements

Interview respondents shared the background of the project as follows: On March 16, 2020, the Netherlands had just entered lockdown when one of the project leaders of the group and Sanquin's management decided that a CCP group must be immediately formed comprising of a representative from every department of the Blood Bank.

TABLE 2 Examples of challenges and improvised solutions.

Step in donation process	Examples of challenges	Improvised solutions
Donor recruitment	<ul style="list-style-type: none"> - To obtain more donors for CCP, the PCR requirement was waived, and the public was asked to donate if they had recovered from any symptoms of the virus infection so that Sanquin could test them for antibody levels. Due to this announcement, there was a waiting list of 10,000 eager participants, which obstructed the system and delayed getting the right CCP donors to donate because there was no space for them. 	<ul style="list-style-type: none"> - New project manager initiated the creation of a digital intake form which the donor could fill out themselves and schedule their own appointment.
Donor eligibility and identification	<ul style="list-style-type: none"> - Identifying eligible donors. - Whether female donors would be accepted due to the risk of transfusion-related acute lung injury (TRALI) from human leukocyte antigens (HLA) antibodies from pregnancies. 	<ul style="list-style-type: none"> - Partnering with the local municipality for evidence of proven PCR tests (although it was "a lot of administration and frustration"); asking cured hospital employees to donate. - Using social media platforms, state-specific criteria or use specific criteria to screen eligible persons. - Female donors would only donate plasma for fractionation.
Predonation screening and testing of potential CCP donors	<ul style="list-style-type: none"> - Generalized lack of knowledge of the virus, donor symptoms, antibody levels, etc. - Hindrances because of the rigidity of eProgesa that delayed donors from donating the same day. eProgesa asks for parameters (e.g., historical blood type) to be filled in, which usually takes 5 days (including validation) so that there is a multiday period between the first donor interview and the first donation. 	<ul style="list-style-type: none"> - The addition of more medical questions in the donor intake form related to their COVID-19 symptoms and progression. - The creation of a new database to store the answers to these additional questions. - Because antibody testing was not yet available, aliquots from additional samples were taken during the donation to be saved for future testing. - Workarounds found for eProgesa to allow for donors to donate on the same day: a manual fingerprick test was done, the result was manually inserted into eProgesa, the donor donated, and routine blood type was obtained from the blood bag approximately 45 min later. Both typing tests had to be the same within eProgesa or the system would give a "blood type error" warning and the product was not released.
Collection methods/ collection facilities	Social distancing in all collection centers, reducing capacity by 40%, along with sick staff.	<ul style="list-style-type: none"> - Opening of plasma-only collection center with flexible hours. - Machines transported to specific locations. - Whole blood donations stopped at certain locations. - Additional hours (e.g., weekends) at certain locations. - Triage at entrance done by volunteers and donor assistants.
Storage and related logistical issues	<ul style="list-style-type: none"> - Specific tubes had to be manually differentiated among thousands of tubes; logistical issues in transporting test tubes all across the country for a clinical study. - Storage and differentiation of aliquots. 	<ul style="list-style-type: none"> - These test tubes were placed in Amsterdam and Nijmegen locations for easier transportation. - Additional freezing space was found for the additional aliquots; lab came up with an identification system to differentiate them.
Testing of antibody levels	<ul style="list-style-type: none"> - Testing method was not decided until July 2020 leading to a backlog of thousands of donations that needed to be tested. 	<ul style="list-style-type: none"> - Aliquots were obtained during donations and frozen. - Sanquin created an internal, sensitive total antibody bridging assays for detection of SARS-CoV-2 antibodies to the receptor-binding domain and nucleocapsid protein in addition to conventional isotype-specific assays.¹⁹
Quality assurance/ regulatory issues	<ul style="list-style-type: none"> - System too slow; change control procedure too slow. 	<ul style="list-style-type: none"> - "Bend the rules without breaking them." - Find ways to move around the system and have shortcuts in the system while ensuring quality and safety are maintained. - Details in processes changed through verbal agreement, and documented later (e.g., SOPs were revised continually and approved formally later).

Abbreviations: CCP, convalescent plasma project; PCR, polymerase chain reaction; SOPs, standard operating procedures.

TABLE 3 Examples of improvisational elements.

Improvisational element	Example and quotations
Team skills	
Expertise	<p>This was evident for regulatory respondents whose expertise lay in knowing protocols and regulations, for such conversations as changing procedural norms within the organization, which was not immediately accepted or understood by everyone: "So let's say 'normal' is that a plasmapheresis donor donates about five times a year—and I ask them now to give their plasma as much as possible, as soon as possible, with as short as possible time intervals because we didn't know anything about titres and how long a titre would be available. These discussions were not always understood by everybody [and caused disagreements], so we had to ask our [regulatory experts] "What do you think of it?" 'Ok, let's go for it.' 'Ok, then we are going to do it.'" (Respondent 7). The regulatory respondents agreed not to follow the old change control procedure but modify it accordingly to expedite processes: "we had to go around the system because the system is too slow." Hence, there was a new, flexible change control mechanism in place. "We learned at Quality Assurance that it is possible to have shortcuts on your change control system. It is possible to have shortcuts on your document management system." (Respondent 8). They outlined that "normally," before any change occurred in the usual collection procedure, a plan would first need to be detailed, assessed, and approved in the change control management system and the accompanying SOP would need to be revised and approved in the document management system; both were tedious and lengthy processes. In contrast, during the pandemic, the change in plans were verbally discussed, a risk assessment was done, and when consensus was reached, then the SOPs were written and/or revised, and approved. In this way, changes could be made rapidly in certain procedures so that CCP could be collected quickly.</p>
Teamwork quality	<p>Respondents shared how they learned to rely on one another to accomplish tasks well: "Because of all the efforts of everybody in this project, and they all see the need of getting it done, a lot of overtime, we did it. And that is something we must be proud of." (Respondent 3). Additionally, there was high awareness of maintaining quality, which doubly benefitted in contributing towards successful "teamwork quality" and product quality: "People were working together in small groups, where I was afraid to lose some of the control, because I wasn't part of every small group. But when you realize at the end of the day, literally—it all comes together. Everyone tells me what they did. They know quality very well. And I don't have to tell them that they have to write an SOP because they know. And for me, that was good to know, that the sense of quality is high in the blood bank. It isn't just relying on me or the QA department." (Respondent 8)</p>
Contextual qualities	
Experimental culture	<p>Respondents stated the difference between the organizational culture before and during the pandemic: "with the traditional slow procedures we have with Sanquin, they were away. We didn't let it happen. We said we are going to do this now, at this moment." (Respondent 4). Another respondent clarified: "A lot more is possible if it has something to do with corona. In the past, it was very difficult to get things done or some people to do something for you. In this time, everyone is cooperative and getting things done quickly." (Respondent 3). Many respondents noted the unique flexibility among staff: "And the flexibility of all the people in the collection center: this week, it must be this way, next week, a different way. A week later, another change." (Respondent 3). As there were insufficient resources during this time, respondents noted that they "made do" with what they had and adapted to whatever changes were happening in the moment.</p>
Real-time information and communication	<p>Respondents shared how in the first few weeks, the CCP group met virtually every morning and evening to provide updates to one another and make decisions based on timely information. Everything was discussed, especially risk assessments and failure models, before changes were made. Secondly, the group ensured that they provided real-time information and communication to other employees outside of the immediate project group, such as the donor assistants, through constant updates to SOPs and email notifications. For external partners, the interviews and document analysis highlighted how the CCP group how communicated and collaborated with the Dutch government, local municipalities, hospitals, and other health services to request that employees or residents who had recovered from the virus become CCP donors. Furthermore, the group communicated with donors to continue encouraging CCP donors to come through Sanquin's Communications Department using various (social) media outlets. Lastly, the group participated in bilateral learning with international blood banks and organizations (e.g., AABB, American Red Cross, European Blood Alliance), during regular meetings, which were dynamic and productive, also resulting in various publications.</p>
Training	<p>Respondents observed that for the donor assistants, the weekly-changing SOPs were challenging; they obtained the new SOPs straight into their inbox, which was convenient, but had disadvantages: "people didn't read it very well" (Respondent 3) and had to implement it immediately on the job instead of having time to process the new information. Both the respondents and document analysis described the latter group of volunteers, which were comprised of employees from different departments and externals, such as medical students. Respondents explained how the Medical Donor Affairs and Donor Information Departments organized a rapid training program that enabled these volunteers to know the process, forms, and navigate the equipment to make the phone calls to these new donors. Because the volunteers did not have all the privileges in eProgesa, they were mentored and monitored by the donor physicians.</p>

Abbreviation: CCP, convalescent plasma project; SOPs, standard operating procedures.

Respondents shared how setting up the project was a myriad of complex steps, including obtaining ethical approval and modifying the electronic information system (eProgesa). However, all these steps were completed rapidly within 14 days so that by March 30, the first plasma donor arrived and could donate. "It was a lot of hard work for a lot of people in a few days. It was pretty impressive, what we did at that time." (Respondent 3). The document analysis recorded the rapid, weekly progress along with the publicity the project began to attain.

Interview respondents, while well-experienced, openly acknowledged the challenges and problems they faced from the beginning. These challenges included lack of knowledge of SARS-CoV-2, time constraints, logistical and administrative issues, found in nearly every step of the process (listed in Table 2). They stated that two of the major issues regarded (I) donor eligibility, identification, and recruitment and (II) SARS-CoV-2 antibody testing. For the latter, for cost-effectiveness, Sanquin developed sensitive total antibody bridging assays compatible to the EUROImmun assay.¹⁹ Additionally, the project was divided into two: collecting CCP for clinical studies and collecting plasma for fractionation (hyperimmunoglobulins). For the former, the CCP group was part of the set-up of randomized clinical trials (RCTs) occurring in university hospitals (one was published internationally as one of the first RCTs about CCP's effects²⁰). To obtain more donors for the latter group, a key requirement was waived, which eventually led to a backlog of thousands of donors whose antibody levels were unknown (Table 2). As CCP collection was done parallel to whole blood collection, there was steady demand of the latter and no shortage of it. However, respondents spoke of staff safety considerations and the Intranet posts highlighted one improvised solution of triaging donors at the door comprised of healthy volunteers (Table 2).

Additionally, respondents could readily identify the elements of an acute crisis: urgency which mandated speed ("in the beginning, it was a bit scary because they wanted to go that fast. Everything was too quick, too fast, and there was no time to think about it" Respondent 8); other events simultaneously occurring which forced this speed; a shortage of supplies; an avalanche of communication requests; and constant changes and adjustments ("every week, it's something different where you have to make adjustments for" Respondent 3). These elements forced respondents to cope constantly with the benefit of increased flexibility but with the negative aspect of overwhelmed staff making (small) mistakes. Throughout it all, there were unspoken goals of putting the patients first and maintaining safety standards. Therefore, this situation forced respondents to improvise incrementally and radically through teamwork at every step, expediting processes (Table 2).

3.1.2 | Underlying elements of team skills and context

Expertise and memory: Through interviews, it was clear that expertise and memory were key qualities that enabled the group to improvise. Most respondents had worked decades in their respective roles at Sanquin and were chosen for their particular expertise and

knowledge to contribute towards the group: "Not many people know eProgesa as good as I...And that's why a lot of projects ask me to join because of this knowledge." (Respondent 3).

However, all echoed the novelty and challenge of such a task: "to create such a new product in such a short amount of time; we've never done anything like it!" (Respondent 4). They expressed how the experience of working through the pandemic situation and the pressures that came with it were novel. However, they stated that though they did not have specific memory of something exactly like this, they knew of what was possible and what was not. This expertise was the decisive factor into the matter: "It was indeed crucial, otherwise we would have been still talking." (Respondent 7). Importantly, they noted that they did not break the rules in doing this but found ample space within them to redefine how things were done. Regulatory respondents reflected on the wisdom they gained from participating within the group, for they experienced how improvisation was a necessary technique in maintaining quality standards and finding ways to maintain high-quality, safe products while meeting the demands of a crisis (Table 3). Overall, by combining their expertise and memory skilfully, they were able to successfully improvise and coordinate amidst a crisis (Table 3).

Teamwork quality: What was emphasized the most during the interviews and evident in the documents was the teamwork quality, comprised of a common goal, trust, and rotational leadership.

Respondents affirmed that having one shared goal to help the patients and help them quickly was crucial in the demanding context they were working in and enabled them to have "spectacular collaboration"; Intranet posts attributed the same. As each member of the group was hand-picked for their roles, there was clear recognition of who had what skill or knowledge. As respondents worked together, trust was built within the team (Table 3).

Regarding rotational leadership, there was some degree of it as the team was subdivided into small groups and took turns leading and following one another; dynamics within the group changed with time: "My job [in Quality Assurance] changed a little bit from someone who...was a referee. I no longer was a police agent. I was one of the guys. I worked with them." (Respondent 8). The group was led by two project managers who gave ample space for respondents to give input. Overall, since this group comprised of some of Sanquin's most experienced employees, they functioned as a higher management group with independence and freedom as top management trusted them. Hence, authority was more decentralized than in noncrisis times so the group could have expedited decision-making, self-coordinate, and adapt quickly according to the circumstances.

Experimental culture: In the interviews, respondents reported the difference they felt in the culture/way of working. They noted the difference from the slow way things were accomplished in Sanquin before the pandemic to the immediacy of decisiveness, action, flexibility, and collaborative spirit that was found during the pandemic (Table 3). The crisis created space for experimentation and the inevitable mistakes that occurred. These mistakes included donor assistants forgetting to take additional test tubes for future

testing or blood product types not being separated well so that time was wasted in manually searching. Many respondents spoke of the notable “experiment” that had to do with donor recruitment, which was both successful and had errors. While publicity had garnered thousands of donors and donations (a success), the backlog overwhelmed the system for months, and it was later found that less than half were not suitable due to insufficient antibody titres: “a disappointment in this whole project.” (Respondent 3). Months later, the challenge was still to find suitable donors with sufficient titres using a combination of old and new strategies.

Real-time information and communication: While Sanquin did not have preplanned procedures of crisis communication in place, intensive communication occurred as many stakeholders became involved and the CCP project entered the Dutch limelight. Both the interviews and document analysis showed how communication efforts were constant and comprehensive, both internally among team members and other Sanquin employees and externally for donors and affiliated organizations such as hospitals, the Dutch government, and international transfusion groups (see Table 3). Keeping up with all these channels was hard work as it was demanding, with constantly fluctuating information that needed to be relayed in the ever-changing context. Internally, one respondent noted parallel elements within the group’s communication: “the lines were short” yet, simultaneously, “there was too much talking” (Respondent 2) which would delay decision-making. Externally, there were challenges in communicating to external stakeholders, such as the donors, so that a special subgroup in the Donor Service Centre had to be created especially for tasks such as ensuring donors booked their first appointment.

Training: Within the immediate group, training was not needed due to the experience and team learning described above. Externally, however, respondents shared how training was done with two specific groups of people: the donor assistants who had to be quickly trained as standard operating procedures (SOPs) changed, and volunteers who aided with conducting intakes for the thousands of new donors who had signed up (Table 3). Overall, respondents’ consensus was that training occurred on an ad hoc, trial-and-error basis due to the constant changes that happened.

3.1.3 | Lessons learned

When respondents were asked what lessons they learned from being part of the CCP group, themes included the successes, challenges, and organizational impact.

Before the pandemic, respondents alluded to the slow and tedious ways that projects were not completed or changes were not implemented. However, during the pandemic, the group discovered that it was possible to (1) accomplish a specific goal, (2) accomplish the goal quickly, (3) by using nontraditional methods exemplified by this quote: “We did NOT go back to, ‘Oh we always used to do this in this way. Let’s do this in this way again.’” (Respondent 7).

This sentiment was echoed by nearly all respondents and elicited an excitement and thrill which directly contributed towards pride at the strong teamwork and collaborative and flexible spirit (“Because of all the efforts of everybody in this project, who all s[aw] the need of getting it done, doing a lot of overtime, we did it. And that is something we must be proud of” Respondent 3). They described that the key to achieving this required breaking free from a set mentality or previous behavioral patterns, as advised by one respondent: “If other countries want to do this, forget about your own documents. Not the system of course, but forget about your own documents, how you do it. How you do it is not important...How do you want to do it, and does it fit in the law and regulations of your country? If it does, just do it and believe in yourself. You can do it.” (Respondent 8).

Through these experiences, several respondents summarized the impact upon the organization: “the pandemic has shown Sanquin at its best.” (Respondent 1). However, since interviews were done after the acute pandemic phase was over and the group was no longer functioning, several noted a transition: “back to business as usual.” Practically, this meant that tasks such as missing documentation was being completed, but in the way of working, the organization was returning to how it used to do things: “what you see now is that it’s going back more and more to the old Sanquin [way of doing things]—which is making decisions and taking a long way of talking and not looking at alternatives” (Respondent 7). This was a regretful thought for some: “I’m afraid that when we are out of this crisis, it will go back to the time before [where it was difficult to get things done], but I hope not” (Respondent 3). Thus, it seemed that being out of the acute pandemic phase, the culture was shifting back to having less flexibility, openness, and collaboration, and respondents were lamenting the change.

4 | DISCUSSION

This study sought to evaluate which elements of team improvisation were present in the early-stage CCP group of Sanquin’s Blood Bank during the acute pandemic phase in Spring 2020. We found that elements of expertise, memory, teamwork quality, real-time information and communication, and experimental culture were strongly present. The element of training was present to a lesser degree.

The crisis situation created an “opportunity window”²¹ for impacts and changes in conventional methods and protocolization as employees found themselves needing *fast* availability of a *new* product in the midst of urgency, pressure, and the unknowns. The elements of team improvisation were activated, catalyzing the group’s strengths of expertise, memory, teamwork quality, and real-time information to form a strong mental model of teamwork. These findings correlate with other literature which explored healthcare organizations’ responses to COVID-19.^{10,22} Wiedner et al. found that key drivers of urgency (in which “normal practices cannot continue and formal regulatory practices become limiting”), resource scarcity, and collective identity (increased cooperation and social bonding that overcome organizational silos) contribute towards organizational

innovation.²² However, authors state that junior, less-experienced staff allow for more innovative ideas,²² which is the opposite of our case study as the composition of the CCP group was of senior, very experienced staff. This is probably due to the latter's collective transactive memory, a diverse past collection of declarative and procedural knowledge of the organization's systems, structure, strategy, culture, rules, and procedures.^{16,23,24} This in combination with the aforementioned strong mental model, trust and safety within the group, allowed the group to improvise effectively and quickly, overcoming lengthy blood bank processes. Such elements are supported in the literature.^{16,23,24}

Furthermore, the crisis allowed for a temporary experimental culture in which control was loosened, autonomy was heightened, and errors were allowed—expected, even—for improvisation to occur. Workarounds in protocols were found and the new digital intake form became a permanent feature of Sanquin's intake process. Top-down leadership changed to enabling leadership to keep efforts moving forward. Respondents admitted how refreshing this cultural change was compared to the slowness and backwardness of the “traditional” environment. This correlates to Lloyd-Smiths' study of the characteristics of a resilient healthcare organization's response to COVID-19 includes sacrificing existing routines and processes,¹⁰ which is a common finding in crisis management and improvisational literature.^{9,16,25} Furthermore, this literature also describes how improvisation occurs on multiple levels (i.e., the individual, interpersonal, and organizational) or degrees (i.e., minor, bounded, and structural).^{9,25} For example, teams can improvise incrementally by adjusting SOPs, but they can improvise radically in times of crises,^{9,25} as seen in our study. Yet respondents' lament that it was “going back to business as usual” alludes to the transition back to how things were. In Duchek's organizational resilience framework, the third step is of “adaptation” in which lessons learned are translated into organizational change.¹⁴ In our study, the group “coped” (the second step) and incremental changes occurred, but there were no radical organizational permanent changes. Reasons include blood banking regulations and the need to revert back to “normal” change control procedures, how different phases of crises warrant different leadership styles and allowances for risk-taking (e.g., in the acute phase, risk-taking is necessary and allowed)²⁶ and/or related to the organizational power and management structures and culture.^{10,14} This then leads to the consideration of what lessons can be learned regarding improvisation and innovation for noncrisis scenarios, which can be challenging for large bureaucratic organizations.

It is notable to mention that though improvisation impacted the set routines and procedures, the safety and quality of the product were not affected, which is an important point as blood banking is rightly heavily regulated. As improvisation occurred, so did verbal risk assessments and failure models. These were discussed before any changes were made. In times of crises, it is common for trial and error to occur and return to risk-aversion when the period has passed. However, looking ahead, with such experiences behind us, one could take the lessons learned from CCP and apply them into

Healthcare Failure Mode and Effects Analysis (HFMEA)²⁷ thereby combining planning with improvisation. Planning is part of improvisation, which is not random moments of spontaneous brilliance but it is a skill that relies on pre-established rules, routines, and cultivation through training and practice.¹⁶ Therefore, improvisational training is needed during times of stability and peace^{16,28,29} for the biggest investment in training cannot occur during crises when it is ad hoc and rapid (as exemplified in this study). Improvisational training includes exercises in listening and communicating, using context-specific knowledge, in a safe context of shared responsibility where members can get out of their comfort zones.^{16,29} This could look like simulation training of multidisciplinary teams from different departments using scenarios from both crisis and noncrisis situations.^{8,29} Benefits include expanding employees' (mental) capacities, character, and skillsets to prepare staff to better perform in times of uncertainty,^{8,28–30} and, equally important for noncrisis situations, boosting creativity communication, and engagement, among other benefits.^{31–33}

Additionally, literature suggests that organizations can catalyze innovation by using the power of employee networks and creating adaptive spaces during crises.^{34–36} Doing so includes the benefits of crisis leadership³⁷ and how team efficacy bolsters organizational resilience.³⁸ This was exemplified as the CCP group and other COVID-19 teams in Sanquin showed that multidisciplinary teams working on a problem early on with sufficient freedom proved to be highly creative and effective. Hence, for times of noncrises, this could translate into improvement or innovation teams working on dedicated topics throughout the organization. These groups would be comprised of key persons throughout the organization not only chosen for their specific function but also for knowledge and ability to bring change internally (“innovators”). This was initiated in Sanquin, such as an improvement team for Sanquin's IT infrastructure and digitalization services. Furthermore, some of the COVID-19 teams have remained together to continue regular meetings, which could be advantageous for budding ideas. Lastly, a BE could consider how “experimentation” (usually linked to research) can occur outside of the Research/Innovation Department to allow for innovation to occur in other departments. This could also be linked to improvisational training as previously mentioned. Overall, management would need to provide adequate support and resources to enable these efforts to be successful.

Many BEs worldwide undertook CCP and most likely deployed improvisational techniques described here (see two detailed articles of implementation from the United States^{39,40}). However, in quickly assessing CCP studies, only three briefly mention the importance of “teamwork”^{3,6,11}; hence, this study is unique in being one of the first to explore this topic within Transfusion Medicine. Strengths of this study include its in-depth look at one group's experiences of team improvisation and its contribution towards organizational resilience during a crisis. Weaknesses of this study include the group's dynamics, organizational context, and even pandemic situation being confined to the Netherlands only and may not be applicable to other CCP groups in diverse settings.

5 | CONCLUSION

As BEs are continuously subject to changes in technology and society, cost pressures, and disruptive events, they are increasingly understanding the need to adapt from “traditionally run” organizations to be able to survive into the foreseeable future. Team improvisation is an important element in doing so as improvisation drives innovation which strengthens organizational resilience, and subsequently, health-care system resilience in which BEs are embedded in.^{22,38}

AUTHOR CONTRIBUTIONS

Praiseldy Langi Sasongko: Conceptualization; data curation; formal analysis; investigation; methodology; project administration. **Hans Vrieling:** Conceptualization; methodology; supervision; validation; writing—review and editing. **Martine de Bruijne:** Supervision; validation; writing—review and editing.

ACKNOWLEDGMENTS

The authors are grateful for B. Ritsema for help in the initial phase of data analysis and the dedication and zeal of the convalescent plasma project respondents for this project. Internal research grant PPOC-L2245. This grant was not involved in any part of the study design, data collection, analysis, interpretation of data, writing of the report, or in the decision to submit for publication.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

No data are available. The qualitative data are not publicly available due to the identifying nature of the qualitative transcripts and lack of consent from participants to publicly share this data.

ETHICS STATEMENT

Sanquin's Executive Board gave approval for this study, waiving it from needing further ethical approval by Sanquin's Research Board.

TRANSPARENCY STATEMENT

The lead author Praiseldy Langi Sasongko affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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How to cite this article: Langi Sasongko S, Vrieling H, de Bruijne M. "Something we must be proud of": an interview and document study of team improvisation in the Dutch convalescent plasma project group. *Health Sci Rep.* 2024;7:e2171. doi:10.1002/hsr2.2171

APPENDIX 11

Table A1

TABLE A1 Codebook of final themes.

Main code	Subcode	Description	Quotations
Background context		Statements or examples regarding the Netherlands' response to the pandemic, Sanquin's context, respondents' descriptions of a crisis, and any other background elements.	There are various phases. First of all, we needed permission. So what we had is we organized everything within a very, very short time and everything was arranged. So a project group was formed from all departments, in fact, within Sanquin Blood Bank. Then this project group met on a daily basis. We had produced, within a very short time, documents for the ethical advisory board and the medical advisory board [so] it had to go into, those advisory boards. And then everything was finished, including eProgesa at the end of March. So the first donation could start on the 30th of March, so that's in 14 days. (Respondent 7) Where they struggled? Well, it's quite simple. There wasn't a great length of time, and there was SO many things to do with a group of people. That was one of the struggles, definitely. So much to do, so little time. So little time, so little people. So they gave a lot of pressure on those people who had to do work. And they worked almost day and night. (Respondent 6)

TABLE A1 (Continued)

Main code	Subcode	Description	Quotations
Expertise		Statements or examples regarding the specific skills, knowledge, and experience that individuals brought to the CCP team that enhanced and enabled the group to develop more ideas.	I do alot...I've worked in Sanquin for almost 39 years. Because I've worked so long within Sanquin, I am the memory of the organization. I have been involved in very many different projects in teh past and that knowledge helps me and the rest of the departments to organise new things. Besides that, eProgesa is my [focus area]. Not many people know eProgesa as good as I because of my experienes in the last years. And that's why lots of projects ask me to join because of this knowledge.(Respondent 3)
Memory		Statements or examples of using or drawing upon stored procedural knowledge to improvise or make workarounds.	In fact, when you know your regulations very truly, you can really help them in telling you what's in the regulations and that this is possible according to their own guidelines and regulations. in fact, everything was normal in telling them, "Okay, let's do this anyway, is any of you against it?" "Yes, I'm against it." "Okay, why are you against it?" "Now, okay, let's discuss this, and is this truly a regulation which is blocking it completely according to regulations?" "Okay, then we should not do it." Otherwise, okay, "what do others think of it?" And we have in our project group [regulatory people who said] "Okay, let's go for it." "Okay, then we are going to do it." (Respondent 7)
Teamwork quality	Rotational leadership	Statements or examples reflecting the ability "take turns" to lead and follow depending on the needs of the situation.	To organize that, this whole IT, I didn't have—well, it was not my expertise. So other people did that. And part of the project group members. (Respondent 3)
	Common goal	Statements or examples regarding the group's common goal that motivated their teamwork.	We all ha[d] one goal: help the patients and help them quickly. (Respondent 8)
	Trust	Statements or examples that reflected the belief in each other's ability or reliability to carry out their tasks individually and collectively.	People were working together in small groups, where I was afraid to lose some of the control. That was a bit scary because I wasn't part of every small subgroup. But then you realize that at the end of the day, literally—because it was 4 or 5 o'clock every day—it all comes together. Everyone tells what they did. And it was, for me, good to see that the people in the departments and in the project group, they know quality. They know quality very well. And I don't have to tell them that they have to write an SOP because they know. I don't have to tell them what chapters there have to be in an SOP because they know. And for me, that was good to know, that the sense of quality is high in the blood bank. It isn't just relying on me or the Quality Assurance department. They know. (Respondent 8)
Experimental culture		Statements or examples regarding room for experimentation and tolerance of mistakes, or possible mistakes, in attempting to do change/improvise.	Well, you know what? We have the plan somewhat in our head. We know what we want to do, and we know why we want to do it. And we approximately know how we're going to do it. So this is our plan and we're going to do it." So it was very—the old change control procedure, we did not follow. So a lot of talks for me with the other compliance officers with the Responsible Person [to tell them], "Listen. We're not going to follow

(Continues)

TABLE A1 (Continued)

Main code	Subcode	Description	Quotations
			the procedure. We're going to do it, and when it's all done, we will write it down. And [then] we will ask your permission to do it." We just changed [compared to the old procedure]. (Respondent 8)
Real-time information and communication	External	Statements or examples of respondents' communicating and responding to external partners.	We had the contact with the hospitals who are participating with studying the COVID virus test. And we wrote them first to ask them if they want to join us with their people, [employees who had recovered from COVID to] donate blood, red cell, plasma. And we did it by our contact with the clinical chemistry from the hospitals... Because we have 14 participating hospitals who are joining the study, we wrote them for the conditions of the study. We did the logistical part of the study from delivering, issuing the plasma units to the several hospitals who had joined the study. (Respondent 5)
	Internal	Statements or examples of respondents providing real-time information to each other and being attentive and responding to each other's needs and the needs of the situation.	It was pretty impressive, what we did at that time...Altogether, we did a lot of work. We had a daily conference call to inform each other and to help each other what must be done, has to be done. (Respondent 3)
	Decision-making	Statements or examples of respondents making decisions with the provision of real-time information.	So as a project, you have to reach something with each other. And with each other, you have to know what is happened where, and how much, and what do you have to do to update with each other to reach your goals...So do we increase the collections? Yes. Where do we increase the collection? Where are the donors? That kind of information. And if everybody knows this information, then it's easier to make decisions to meet your goals." (Respondent 4)
Training		Statements or examples of respondents talking about teaching someone a specific skill to contribute towards the CCP initiative.	We try to ask them if they could help us with the intake conversation, the telephone calls for the intake meetings, calls. So a lot of external people were involved in that process, and we have to train them and to support them. They didn't have all the privileges in eProgesa, so they had a mentor that was a donor physician of Sanquin. (Respondent 3)
Steps in the donation process/supply chain	Donor recruitment	Related to the challenges of obtaining sufficient donors using various media outlets, and subsequent improvisation therein.	In between, at the same time also, the Erasmus Hospital had applications on this and this speeded our process enormously, so increased the speed of our process enormously because, within a week time, we had about 2000/3000 donors via this social media [advertisement]. (Respondent 7)
	Donor eligibility (including predonation screening) and registration	Related to the challenges after donor recruitment of assessing whether that donor meets eligibility criteria to register as an official donor and the subsequent improvisation. This included assessing whether potential donors satisfy criteria specific to CCP, which includes screening electronically or over the phone with specific questions, a formal documentation of testing, having had a certain number of days following resolution of symptoms,	Well, I think the biggest mistake we made (and it's still not solved) is the part right after donor recruitment. It was too successful. There were too many donors, and we were overwhelmed. We didn't see it coming. We were overwhelmed... Recruitment is easy. If you have the right words and everything, people will come. But after that, you have to register them in the donor administration program. You have to talk them through. You have to make sure that they do have the antibodies. And yeah, well, maybe if we had time, it would have been nice if we had the test for

TABLE A1 (Continued)

Main code	Subcode	Description	Quotations
		and/or demonstration of antibody formation.	the antibodies before recruitment. Because then, yeah, it would have made it easier to have people donate. And then we would have seen we have existing donors with antibodies. But to have interviews with people, to have them tested—you need people [employees] to do that. You need space. You need time. And we didn't think that through very good. (Respondent 8)
	Collection methods	Related to the logistics of how CCP is collected and the challenges encountered and subsequent improvisation therein.	There are 16 plasma collection centers in the country, but with the 1.5 m separation, capacity diminished. So a task force led the way to look at [improving] logistics. There were some problems. At this point, the hyper IgG project had begun so they too needed more plasma, but it needed to be separated from the other collection. Also at this point, the RCT at Erasmus was still undergoing and the plasma collected for them needed to have separate logistics for separate antibody testing with extra tubes. While this was a small sample of the overall collection, it was a hassle to separately collect, store, and hand-collect from inventory etc. (Respondent 1)
	Product characteristics	Related to the differentiation of CCP from other plasma products and subsequent improvisation therein.	But it is a convalescent plasma, that's the only difference. So it has to do with precursors by the donor to establish if the donor is the right donor to donate his blood or her blood. That's the main difference. And you have to keep it separate from all the other plasma so that you know i) this is a convalescent plasma, and ii) this is standard plasma. So that is to keep in mind. (Respondent 6)
	Testing	Related to the challenges of antibody testing, its logistics and subsequent improvisation therein.	We were very busy develop[ing] tests for the antibody testing. And it was very difficult to find suitable tests because we wanted the right antibodies in our product. I don't know if you're familiar with it, but it's just IgG and IgM and the neutralizing antibodies. But now with the neutralizing antibodies, that's the antibody we want in our product. But you have to have a test to find these, and not all tests are suitable to find these antibodies. (Respondent 3)
	Storage and logistics	Related to the challenges of finding stored CCP units in the inventory stock, transportation issues, and subsequent improvisation therein.	Because we have to search in our stock of plasma for the one unit that Erasmus sent us, the unit which has to [be] transported to the hospital, for example, in Groningen or in Rotterdam or in Nijmegen. [Interviewer] But do we not have a system where all units are labelled in the computer so you can just look it up in the computer system? Yes, we can, but we have to find it in the stock. We have 1000 units of stock on the location. And we have to find THAT ONE with THAT number to the thousand units we have. [Interviewer] Wow. That's like searching for a needle in a haystack. Yeah! And we started, of course, in the beginning with hundreds plasmas on stock. That was fairly

(Continues)

TABLE A1 (Continued)

Main code	Subcode	Description	Quotations
			simple to find the one. But later on, we had thousands of units, and that was a lot of problems.(Respondent 5)
Lessons learned	Successes	Statements or examples where respondents stated that a scenario was successful.	Well, the success we just talked about before, that we made it done within a few weeks, have products on the shelf. Normally, such products take months to get it done. Because of all the efforts of everybody in this project, and they all see the need of getting it done, a lot of overtime, we did it. And that is something where we must be proud of. (Respondent 3)
	Challenges	Statements or examples where respondents stated that a scenario was particularly challenging or problematic.	And having sufficient place, having sufficient donors, because it was a challenge to have all those donors at the right time available because they were waiting, and sometimes they were waiting—2000 donors or so—for getting the first medical checkup! So this was a challenge. Then also, with the one meter fifty social distancing, with also the COVID triage, which was in all the centres, how to handle that? How to have sufficient space in the donor centres? (Respondent 7)
	Lessons for low-to-middle-income-countries (LMICs)	Statements or examples in response to the question of “what lessons did you learn that are applicable to LMICs?” Or “what kind of advice would you give to LMICs trying to start a CCP program?”	What we experience in the Netherlands is that the donors who apply to this project feel responsible for future patients to do this, so we try to apply on their responsibility... You can become a hero when you donate plasma. You can help your other patients. I think that's a good strategy to build on other people's donor motivation thing. What we DIDN'T want to do is getting donors in by testing them first because we think we get the wrong donors in-house [meaning, offering a covid test in exchange for donation]. In other countries, it may be a good way to get them in. So you can give them a kind of reward by coming. (Respondent 3)
	Impact on organization/organizational changes	Statements or examples of how the organization was impacted/changed through COVID, including any observations how it was resorting “back” after the CCP initiative.	This pandemic has shown Sanquin at its best. We had the possibilities to make decisions and act quickly and that was good. (Respondent 1)

Abbreviations: CCP, convalescent plasma project; RCT, randomized controlled trial.