

ORIGINAL ARTICLE

Implementing virtual interprofessional education in an undergraduate medical program: A feasibility study

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ABSTRACT

Background: Virtual interprofessional education (VIPE) presents an opportunity to develop interprofessional competencies in undergraduate medical students. This paper describes the feasibility of implementing VIPE in an undergraduate medical program. **Methods:** A multiple-methods research design incorporating quantitative and qualitative elements was used to describe undergraduate medical students' experiences of an international VIPE intervention. Eleven universities and students in 14 different health professions participated in synchronous and asynchronous sessions. A number of 41 medical students completed an online post-assessment survey, of which six volunteered to participate in a focus group discussion related to their VIPE experience. Descriptive statistics were used to evaluate the post-assessment survey, while inductive thematic analysis was applied for qualitative data. **Results:** The quantitative responses indicated an awareness of interprofessional education (IPE) competencies, such as role clarification, team functioning, interprofessional communication, person-centeredness and values and ethics. The focus group discussions supported the quantitative outcomes where the themes reflected the significance and influence of the educational program, clarifying engagement and recommendations for the future of VIPE. **Conclusion:** The findings of this study demonstrate the feasibility and value of VIPE as a reasonable alternative to face-to-face IPE. VIPE may have additional benefits such as cross-institutional and international engagement. This evaluation also provided valuable lessons for the more widespread implementation of VIPE.

Key words: virtual interprofessional education, feasibility, medical program

INTRODUCTION

Interprofessional education (IPE) is heralded as a strategy that fosters collaborative practice among health professionals.^[1,2] A growing body of knowledge describes the adoption, development, and evaluation of IPE initiatives globally.^[3,4] Moreover, several countries now require all undergraduate health professions students to provide evidence of IPE at graduation.^[5]

These IPE initiatives appear to be aligned with the "Framework of Action" proposed by the World Health Organization (WHO) that recommends IPE as a strategy to catalyze collaborative practice through the development of four key competencies, namely values and ethics, roles, and responsibilities, interprofessional communication and teamwork.^[6]

The integration of IPE initiatives in higher education has

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predominantly been reported in high-income countries, primarily through face-to-face approaches.^[3] While most reported IPE face-to-face initiatives result in positive educational outcomes,^[7] some programs are fraught with significant logistical and administrative challenges.^[3] The coronavirus disease 2019 (COVID-19) pandemic further complicated the delivery of IPE, prompting educators to explore alternative educational strategies. Khalili^[8] explained that the COVID-19 pandemic had created opportunities and positive lessons that could be seized to enhance IPE through fully exploring the potential and impact of information and communication technology (ICT) in IPE.

Using ICT to facilitate IPE has increased steadily over the last decade.^[9] Globally, such technologies have created online and virtual IPE (VIPE) learning platforms across various institutions. Luke *et al.*^[10] argued for participatory and collaborative models in designing and implementing VIPE, allowing for knowledge-building, constructivist, problem-based, and transformative learning. VIPE must create a space for meaningful discourse that will promote a process of articulation, reflection, and negotiation in a collaborative manner as students co-construct new knowledge.^[8] Achieving such standards for VIPE will require educators, students, and the platform for learning to be aligned and relevant for the context.

Educational interventions such as VIPE are complex initiatives that have multiple outcomes. The fidelity of implementing a designed VIPE is influenced by various contextual factors that could result in diminished educational value.^[8] Such consequences may directly affect students, resources, and educators, creating a damaging perception of IPE as an educational concept. Kendall-Gallagher *et al.*^[11] argued against blanket-wide program implementation, building on the argument made by Mogre *et al.*^[12] who encouraged embedding the context in the development and implementation of educational interventions. Ten Cate and Billett^[13] also contested the universality of educational interventions. They proposed that educators and researchers' pilot or test an educational intervention's feasibility within a context before system-wide or institution-wide implementation. Feasibility outcomes may be essential in refining an educational intervention, improving its potential of meeting the intended educational outcomes.

The adoption of VIPE in most education settings, catalyzed by the COVID-19 pandemic, has created a space for questions around the quality of such educational interventions and the achievement of educational outcomes. These questions are especially relevant in resource-restricted environments where online teaching poses additional challenges. Several studies have identified specific challenges associated with

online teaching, namely internet speed and technical issues, flexibility, content availability, and student engagement.^[14,15]

Eleven universities from the United States of America, the United Kingdom and Africa established an international collaboration to develop an inter-institutional and inter-continental VIPE initiative.^[16] The VIPE was an innovative solution to face-to-face, institution-based IPE programs, especially during the COVID-19 pandemic. The collaboration aligned the characteristics of the VIPE program with the elements of a curriculum^[17] as summarized in Table 1.

The VIPE program had asynchronous and synchronous aspects. Students asynchronously received and accessed an electronic link to the VIPE webpage. The content included various professional roles, interprofessional competencies, videos on a simulated case and instructions related to the synchronous event. During the two-hour online synchronous session, the primary host briefed students on engagement with the virtual platform, including crucial expectations. The students were then allocated into break-out rooms based on their professional background, where a facilitator supported discussions on the case video. Students verbally contributed to the development of an interprofessional care plan. After the student discussions, the primary host facilitated a debriefing and feedback session in the larger group.

In this study, we report an evaluation of the feasibility of this VIPE intervention in an undergraduate medical program based on students' experiences. We argue that insight into the recipients' experiences of educational interventions is valuable in describing the feasibility of education innovation.

METHODS

We applied a multiple-methods research design, including quantitative and qualitative research approaches 18 which allowed the authors to pragmatically evaluate the VIPE intervention. The study population comprised 52 undergraduate medical students at one university. These students were included in this study because they were enrolled in a non-conventional medical program which does not have IPE related learning outcomes. This specific medical program is an outcome of an inter-governmental agreement where students spend most of their training in a foreign country and only in their final year are they assimilated into the local universities.^[18] We used census sampling to include all of the students in this study.

Quantitative data were collected through an online self-administered post-assessment survey after the VIPE

Table 1: Characteristics of the VIPE curriculum in correspondence to the elements of a curriculum

| Element | Characteristics of the VIPE program |
|-------------------------|---|
| Learning outcomes | Establish shared values within a collaborative practice environment |
| | Demonstrate shared decision-making and shared power through effective communication |
| Education strategy | Flipped classroom approach |
| | Case study discussion |
| Educational environment | Computer laboratory based at the university |
| Assessment | Post-assessment survey |
| Content | Professional roles |
| | Interprofessional competencies |
| Learning opportunity | Case study based on the South African health environment |
| | Asynchronous learning before the synchronous session |
| | Two-hour online synchronous session |
| | Interprofessional student groups to encourage in-depth discussion on the case |
| | Facilitation of student groups |
| | Reflection on the case |

VIPE: virtual interprofessional education.

session. The initial section of the survey had a 7-point Likert scale focusing on IPE competencies, and the subsequent section focused on the application of IPE knowledge on 11 vignettes. The authors then facilitated a focus group discussion with six volunteer students exploring their experiences of the VIPE intervention. The authors facilitated the focus group discussion with an external moderator. The students were asked to describe their experiences of the VIPE intervention. All discussions were audio-recorded and stored in password-protected electronic media. In addition, field notes were collected during the focus group session. The participants of the focus group were given pseudonyms focus group student (FGS) and a numeric based on their seating position, for example the first student was labelled FGS1.

The quantitative data were captured on Qualtrics software® (Qualtrics, Provo, UT, USA) to generate response frequencies per question. Concerning the clinical section of the post-assessment survey, a memorandum was used to classify the student responses as correct or incorrect. The authors inductively analyzed qualitative data from the focus groups through thematic analysis underpinned by the qualitative data analysis framework proposed by Saldaña.^[18]

RESULTS

Of the 52 students who took part in the VIPE intervention, forty-one completed the post-assessment survey, providing a response rate of 78.8%. The initial section of the post-assessment survey evaluated the participants' knowledge of IPE competencies. After the VIPE session, when asked how well they knew IPE,

17.1% of students said extremely well, while 63.4% said very well. The participants indicated that they understood the roles and responsibilities of different healthcare professionals within the interprofessional healthcare team either extremely well (20.16%), very well (31.33%) or moderately well (33.74%). The participants indicated strong agreement (73.68%, $n = 30$) that they enjoyed meeting people from other locations and universities. Table 2 presents the degree of agreement related to the achievement of VIPE outcomes as indicated by the participants.

The last section of the questionnaire focused on applying learned IPE competencies. The participants were assessed on their knowledge regarding the responsibilities of various health professionals regarding patient care through 11 case vignettes.

Table 3 reflects the correct and incorrect responses from the participants as they applied their immediate knowledge on professional roles in specific cases. This data indicated that more than half of the participants correctly responded to only four of the 11 cases.

From the focus group discussion, four themes emerged that reflected the participants' experience regarding the VIPE intervention. The findings of the focus group supported the feedback from the post-assessment survey as seen from the four themes: Interprofessionalism, education program, engagement, and the future of VIPE. Table 4 presents the themes and sub-themes from the study.

Theme 1: Interprofessionalism

The participants experienced interprofessionalism during the VIPE intervention. This theme was underpinned by

Table 2: Perceived outcomes of the virtual interprofessional education intervention

| Statement | Strongly agree | Agree | Somewhat agree | Neutral |
|---|----------------|-------|----------------|---------|
| 1. I understand when to refer a patient. | 34.2% | 51.2% | 14.6% | 0 |
| 2. I understand who to refer a patient to. | 25.0% | 62.5% | 12.5% | 0 |
| 3. I feel confident in my decision to refer a patient to the correct provider. | 22.5% | 57.5% | 20.0% | 0 |
| 4. I feel this experience will be beneficial to my career. | 50.0% | 40.0% | 10.0% | 0 |
| 5. I learned more from this group than I would from people within my own university or workplace. | 27.5% | 47.5% | 22.5% | 2.5% |
| 6. The online modality for this experience was beneficial to my learning. | 37.5% | 52.5% | 10.0% | 0 |

Table 3: Responses to vignettes

| Vignette | Correct | Incorrect |
|--|---------|-----------|
| A 75-year-old male presents to your clinic with a past medical history of TIA and CAD. He presents with dysphagia (difficulty swallowing). Along with other tests, which provider/providers would order the consult for the SLP? | 47.7% | 52.3% |
| A 52-year-old Puerto Rican female presents with impaired attention, memory and problem solving following a resection of a meningioma. Which provider/providers would be most likely be involved in her rehabilitation to target these impairments? | 48.1% | 51.9% |
| A 60-year-old Caucasian female presents to the clinic status post fall and wants a refill of her pain medication. Which provider/providers would be able to order this for her? | 52.9% | 47.1% |
| A 66-year-old Hawaiian, Asian Pacific male patient presents to the inpatient unit with COPD and a CVA. The patient is known to the inpatient unit and is a smoker. Which provider/providers would best counsel the patient on smoking cessation? | 43.3% | 56.7% |
| A 79-year-old Caucasian female presents to the acute care unit with impaired balance and mobility status post a fall and hip fracture with a reported 6/10 pain level. Which provider/providers would be involved in her care? | 65.7% | 34.3% |
| A 45-year-old African American female presents to your clinic and is discharged with a Z-pak. Which provider/providers writes the prescription? | 36.0% | 64.0% |
| Which provider/providers conduct(s) a population-based study to evaluate the genetic risk factors for appendicitis? | 51.7% | 48.3% |
| Which provider/providers analyze(s) most recent data in the tumor registry and discovers the median survival time following the diagnosis of a specific cancer? | 33.3% | 66.7% |
| Which provider/providers is/are responsible of communicating a recent outbreak of Zika and preventive measures to a community? | 64.5% | 35.5% |
| Which provider/providers of the healthcare team notes a medication allergy discrepancy prior to administering the medication and holds the medication in order to consult with other members of the interdisciplinary team? | 15.7% | 84.3% |

TIA: transient ischemic attack; CAD: coronary artery disease; SLP: speech-language pathologist; COPD: chronic obstructive pulmonary disease; CVA: cerebrovascular accident; Z-pak: zithromax.

three sub-themes: awareness of other professionals and their associated roles, professional clarity, and holistic patient care. The VIPE intervention exposed the students to other professionals and their role within patient care as they created the interprofessional care plan. Concerning the sub-theme of awareness, the participants verbalized:

“A lot of people would say, in my capacity, this is what I would do, in my role as an occupational therapy (OT) or OT capacity this that I would do. There was a pharmacist and physician assistant as well. I learned a lot from their own perspective of things, as though there are overlaps in some of the things that we do for the patient but the specialties that they do for the patients for me that was interesting” (FGS5).

“But seeing it happen yesterday was a whole other level, I mean I could see how much people know and how much people want to help, and that was mind-blowing for me” (FGS1) and “This was important to me to note that there are other fields outside of medicine” (FGS6).

Awareness of professional roles enhanced professional clarity. The participants of this intervention recognize their professional role within patient care, their contribution to patient care, and their part of a team in inpatient care.

“I think this helped me. Initially, I always thought that the doctor is the beginning and end of everything, and I realized that this is not the case” (FGS4).

“But this helped me learn that you do not have to refer them only to the medical side, but also to other fields and other professionals that are linked to healthcare and who are of benefit to these patients” (FGS2).

Awareness of other professions and professional clarity culminated into a holistic patient care approach. This approach links with transformative patient care and appreciation of teamwork and universal connections.

“But then you see someone else, and they aim at wanting to make their social life functional before we can treat

Table 4: Themes and sub-themes

| Theme | Sub-theme | Category |
|----------------------|----------------------------------|-----------------------------------|
| Interprofessionalism | Awareness of other professionals | Role clarification |
| | | Professional awareness |
| | | Professional conceptualisation |
| | Professional clarity | Own professional role |
| | Holistic patient care | Transformative patient care |
| Teamwork approach | | |
| Universal connection | | |
| Educational program | Educational environment | Inclusive |
| | | Non-judgemental |
| | | International socialisation |
| | Educational design | Practical approach |
| | | Grouping |
| | | Communication and synchronisation |
| Engagement | Logistics | Technical issues |
| | Facilitators | Facilitator training |
| | | Session management |
| | Group creation | Group diversity |
| The future of VIPE | Physical environment | - |
| | More time | - |
| | Preparation instructions | Communication |
| | | Condensing preparation |
| | | Clear expectations |
| | | Clear instructions |
| Planning experience | | |
| Self-discovery | | |

VIPE: virtual interprofessional education.

the patient, and you like whoa, and basically it gives you fresh eyes and how you can treat the patient as well” (FGS5).

“... in my group I think I had people from the US, South Africa, and I also have a few from different countries, but what I enjoyed the most was seeing that you treat the patient the same way regardless of where you are in the world, like a piece of cable with all the same you all at the end of the day” (FGS5).

Theme 2: Educational program

Participants’ comments in this theme were underpinned by four sub-themes: the educational environment, education design, preparation, and logistics. Regarding the educational environment, the participants commented on their comfort and ease in interacting with other participants. Participants expressed that they had experienced a learning environment that was inclusive and non-judgemental and allowed for international socialization.

“... even if it was not related to your professions she would still ask you and you would explain as you were thinking out of the box” (FGS1).

“We got the contacts of other participants in the international (educational space). Through this session we can also start to link with participants here” (FGS3).

The participants commented on the educational design of the intervention—these comments linked to the practical approach of the case. Instead of only being taught on interprofessionalism in theory, participants explain the value of the opportunity to apply their learning in a contextualized case.

“So, in that sense, I got a little bit of what professions do, and I like the fact that this discussion was centred on the case, so it was more of a practical takeaway” (FGS1).

The participants expressed appreciation and concern for grouping participants within the break-out rooms. The participants appreciated the benefits of engaging with the case in groups, although they felt that the diversity of professionals could have been enhanced. Some groups had more participants from the same profession, while other professions were not represented in different groups.

“... a fair presentation of the professions, so my group it was mostly the SLP. So think that also took away from sort of getting a better understanding of everyone’s involvement in the particular case” (FGS2).

The participants further mentioned the influence of the preparation process ahead of virtual engagement. Participants noted that the asynchronous activities prompted them to research the responsibilities of other

professionals and gave them a mental picture of the expectations of the synchronous time. However, there was a need for strengthening communication and synchronization in preparation for the session.

“Where my mind had to be in terms of thinking of other professions like saying that you know to consider everyone has a different profession. And then after watching the case, and reading about the case, I just started mentally preparing myself to thinking about the patient as a whole” (FGS3).

“I needed the varsity to first send an email and say guys, this is needed, and this is what you are expected to do. I mean it was only last week our leader told us that oh guys you need to register, and this is what is going to be happening, only then we started to prepare” (FGS1).

The highlighted logistical issues related to the technical matters influencing participation in the synchronous session. Participants engaged with the synchronous sessions at venues with computers not equipped with the appropriate audio hardware, such as earphones. Participants used their earphones and contributed to the discussion using the chat function. This technical limitation appeared to have affected their participation. They struggled to log in, could not type quickly enough, had audio-visual challenges. Their chats appeared to have been ignored by some facilitators who focused mainly on participants who had video and sound functions activated from other universities and countries. One of the participants expressed that: “I could not really get into the introduction I missed the whole, like, first five minutes trying to sort out my microphone trying to see what I can do. So the introduction the whole, the beginning of, my group, our group break-out group. I did not quite engage was not part of it, so then, it was typing, and that was another situation” (FGS3).

Theme 3: Engagement

The participants of the entire VIPE session were expected to be engaged with the VIPE program, building on what was learned in the asynchronous session and applying it during the synchronous session. Engagement meant that they would actively participate in all the pre-planned interventions. The theme engagement is underpinned by two sub-themes: the facilitators and group creation. The participants commented on the competence of the facilitators and expressed concerns on the quality of facilitation: “I think with training the facilitators or sort of guiding them as to how to take on the task” (FGS5).

The break-out rooms were aimed at creating a smaller group of participants who could communicate and engage effectively. Ideally, participants were expected to

be in the groups based on their professional backgrounds. However, participants in this group expressed that they faced undue pressure if they were the only representative of their profession. This pressure influenced their engagement during the synchronous VIPE session, leading them to recommend a different structure related to group diversity, namely: “I recommend that there should be at least two members of the same profession in each group, at least to help each other and back each other during discussions. When there's only one profession sometimes there's too much pressure for that one person to speak or shy away and that keeps me from learning from and about their professions” (FGS2).

Theme 4: Future VIPE

The theme related to future VIPE echoes various recommendations related to the improvement of the VIPE program. The participants felt that the physical environment where the program was conducted needed to change. They expressed that they would have had better connection and engagement if they had used their devices in their private residences. One of the participants mentioned: “Some people managed to connect from home. This would have made our engagement much better and things are so much more comfortable to engage and even in our own private spaces” (FGS6).

The participants expressed that they wanted more time for interaction and to engage further, as the two-hour contact session appeared to be insufficient. One of the participants mentioned: “...it would be better in the sessions to give a little longer, because in our session, by the time I think we had five minutes remaining, we only, like, scratched the surface of the entire space. And so as much as students we usually do not want to stay long, I feel we needed more time.... we were really engaged” (FGS2).

Furthermore, they explained the need for improved communication between participants and the institution, particularly regarding the program and processes. This communication should include preparation instructions, clear expectations, and clear instructions.

“... perhaps if we had only done or received the information beforehand, then we could have gone through all the videos and there would not have been so much pressure on us” (FGS1).

Specifically, on the resources used asynchronously, the participants felt that information about the professions should be presented differently, as short videos with some of the information in writing. Participants in this study felt that the participation of the mainstream undergraduate health professions students in this

intervention would have been beneficial in assisting them in socializing into their university.

“If there were other students from here, who were part of us definitely this would have made this better. Also this was going to help us now in creating relationships with other students in the varsity who are not studying medicine, we can start to create context for each of us as much as we benefited from the international platform” (FGS5).

DISCUSSION

We argue that students’ experience as recipients of planned educational interventions is valuable in describing critical elements of the feasibility of an educational intervention. This paper reports on the feasibility of a VIPE intervention based on the experiences of undergraduate medical students at a university. Thabane explains that the process, resources, management, and scientific merits of an intervention should underpin the description of the feasibility.^[19]

According to Thabane^[19] the process reflects aspects essential to attaining the intended intervention outcomes. The integration of the VIPE into the medical program fostered medical students to be exposed to IPE. Accordingly, the students identified areas of improvement related to the process, specifically concerning the technical aspects of the VIPE program. Access to asynchronous material occurs at students’ time and allowed for self-paced learning while solving a case within the synchronous sessions created an opportunity to solve problems.^[20] In the asynchronous sessions, students experienced ineffective communication and coordination and reportedly struggled with the learning material’s approaches. This experience could have contributed to a perceived lack of readiness for the synchronous sessions and the challenges experienced when students failed to solve the case vignettes after the synchronous sessions correctly.

Like the experiences reported by Panda *et al.*^[15] technical issues negatively affected the group engagement during the synchronous sessions, which is often not reported in face-to-face IPE. In face-to-face IPE activities, technical challenges are often replaced by logistical challenges such as accessing venues that accommodate students and facilitators and synchronizing student timetables from various programs. As much as the virtual platform would be a sound alternative to face-to-face IPE, considerations on the practicality of technical support should be paramount to ensure that all students are engaged with the pre-planned sessions. Ten Cate *et al.*^[13] emphasizes the need to pilot and adjust educational interventions, including technical issues, before system-

wide or university-wide implementation.

Resources reflect the time, capacity, equipment, software and even budget related to the intervention.^[19] The time of the VIPE intervention appeared not to be aligned with the expectations of the medical students. These students felt the need to engage virtually with students in the mainstream medical program at the institution, to enhance their socialization. Moreover, the two hours allotted for the synchronous event appeared insufficient to meet students’ needs as they requested more time for the session. A need for prolonged engagement in educational events for any sustained cognitive development has been expressed in the literature.^[21] Extending the VIPE session or creating multiple sessions with the semester would be essential in enhancing and fostering student understanding of the IPE competencies.

Management relates to the potential human and data optimization programs, such as personnel and data management issues.^[19] During the asynchronous phase, the management of the learning process had flaws that could quickly be addressed through improved communication, coordination, and scaffolding. The students reflected that the facilitation processes allowed them to express themselves freely, yet at the same time, some facilitators could not equally engage students. The varied experience related to facilitator competence might have been due to the different levels of competence among the facilitators about education and facilitation of engaging sessions.^[8] Foulger *et al.*^[22] reflected on the success of adopting online education as vested on the competence of educators. To enhance the quality and value of the VIPE sessions, the facilitators need to be empowered to facilitate in an online space.

Scientific merits are from the quantitative aspects of the study,^[19] specifically regarding meeting the expected learning outcomes of IPE competencies and their application on specific case vignettes. Overwhelmingly, students reported that they had better knowledge of IPE. They further noted that they had learned from this experience and were ready to apply the IPE theory into practice. On examining the application of their new knowledge on vignettes, their combined scores were incorrect and below the expected responses. It may be true that a single intervention may not have been sufficient to reinforce transformative learning among students, and we acknowledge that this may have been a challenge. Studies reported in the literature also describe the superficial impact and limitation of self-assessment where a high self-rating of positive outcomes, which usually does not translate into positive results on objective assessments, as reflected by the Dunning-Kruger effect.^[23]

CONCLUSION

While the results of this work are encouraging, there is room for additional work on VIPE before institution-wide implementation. Institutions attempting to introduce VIPE into undergraduate medical education must consider, investments in appropriate technology and audio-visual resources. Timeous and clear communication between organizers and students must underpin the asynchronous sessions. The VIPE should be developed to support students assimilate their learning through extended time for synchronous engagement. Institutions must empower all VIPE facilitators in facilitating in the virtual space as students' learning experiences are hinged on the facilitation approaches.

DECLARATIONS

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Author contributions

Nyoni CN: Conceptualised the study, collected the data, analyzed the data, drafted the manuscript. Botha R: Conceptualised the study, collected the data, revised the manuscript. Ntsekhe-Mogashoa T: Conceptualised the study, analyzed the data and revised the manuscript.

Ethics approval

The Health Sciences Research Ethics Committee (HSREC) of the University of the Free State (No. UFS-HSD2020/1414/2710) approved this study. All participants consented to participate in the study, and ethical considerations were considered throughout the study.

Informed consent

The authors declare that they have obtained students' consent to publish this article.

Conflict of interest

Champion N. Nyoni is an Editorial Board Member of the journal. The article was subject to the journal's standard procedures, with peer review handled independently of the Editor-in-Chief and the affiliated research groups.

Data availability statement

Data used to support the findings of this study are available from the corresponding author upon request.

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