

# iPad-based Apps to Facilitate Communication in Critically Ill Patients with Impaired Ability to Communicate: A Preclinical Analysis

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## ABSTRACT

**Background:** Inability to communicate is very distressing for patients in the intensive care unit (ICU). Most communication exchanges in ICU are initiated by healthcare workers (HCWs). Touch screen apps may enable patients to initiate communication and improve their interactions.

**Objectives:** This study aimed to evaluate the pertinent features of iPad-based apps designed for communication in ICU.

**Methods:** Apple "App Store" and Google "Play Store" were searched for keywords "communication" and "intensive care." Related app suggestions were screened. Two independent assessors evaluated iPad-based apps that were deemed useful. The assessors resolved the discrepancies by re-evaluating the apps and reaching a consensus.

**Results:** Nine apps met the inclusion criteria. Of these six apps were free. There were seven apps specific to intensive care. Most apps had preloaded phrases for the patient to request to see someone (e.g., family), personal hygiene (e.g., bowel care), seek help with symptoms (e.g., pain), or a comfort item (e.g., blanket). CALD Assist, Patient Communicator, VidaTalk, and YoDoc were available in more than eight languages. VidaTalk and YoDoc allowed the user to write. Four apps were deemed not suitable for routine ICU use, while the remaining five had several attractive features.

**Conclusion:** Several high-quality apps are available to assist with patient-initiated communication exchange in ICU. This study provides a guide for readers to choose the app most suited to their needs. In the opinion of the authors, YoDoc is the most suitable app for routine use in ICU. Among free apps, CommuniCare appears to be the most user-friendly.

**Keywords:** Augmentative and alternative communication, Communication, Culture, Information and communication technology, Intensive care.

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## INTRODUCTION

Effective communication with patients in the hospital improves both patient-reported and objective outcomes.<sup>1</sup> As many as 40% of patients in the intensive care unit (ICU) report difficulties in communication.<sup>1,2</sup> The reasons include endotracheal intubation, tracheostomy, requirement for noninvasive positive-pressure ventilation, head and neck surgery, stroke, sedation and sensory impairment, and inability to comprehend language spoken by healthcare workers (HCWs).<sup>3-6</sup> A modern impediment to communication is the increased use, as a result of the coronavirus disease-2019 (COVID-19) pandemic, of personal protective equipment, which can impair communication by lowering voice volume, and by concealing lip movements, facial expressions, and name badges.<sup>7</sup>

Up to 90% of the patients report extreme distress due to difficulty communicating, with associated anxiety, panic, anger, and sleeplessness.<sup>3,8,9</sup> Inadequate communication may result in impaired symptom identification and participation of patients in management decisions.

Multiple augmentative and alternative communication (AAC) techniques, both unaided and aided, have been employed to improve interaction with ICU patients. Unaided AAC techniques, like lip reading, coded eye blinking, gesturing, and head nods,<sup>10,11</sup> achieve limited patient and HCW satisfaction. Several basic patient needs, such as turning, suction, or requests to see other staff or family members, cannot be conveyed with unaided AAC.<sup>1,2,12,13</sup> Aided AAC tools include "low-tech" interventions, such as pen and

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paper or communication boards, that have proved durable but are inefficient.<sup>14</sup> Several "high-tech" interventions such as tablet-based app and eye-tracking software have now become available.<sup>10</sup>

Apps employ touch screen technology to expand on traditional talkboards and require little operator expertise.<sup>10,11,13</sup> These apps may facilitate nonverbal communication, which is patient-initiated, detailed, and critical care specific. There is emerging evidence that apps may improve communication and that patients will use them if they are available.<sup>15,16</sup> However, there is little high-quality data regarding the features or relative efficacy of these communication apps.<sup>5,10,17</sup>

A good communication app for patients in ICU should be visually stimulating, but not distracting or cause information overload. It should have an adequate font size, good contrast, preloaded ICU-specific phrases (e.g., I need suction, I am in pain), and be available in multiple languages.<sup>18</sup> This is a preclinical bench study aimed at evaluating various iPad-based communication apps specifically designed for use by patients in the ICU.

## METHODS

In November 2020, the “App Store” (Apple, Cupertino, California) and “Play Store” (Google, Mountain View, California) were searched with the keywords “Communication” and “Intensive Care.” Related app suggestions were also screened to find further appropriate apps. The review of the apps is current as of May 7, 2021.

The inclusion criteria for further assessment of an app were that it was available on iPad in Australia and deemed helpful for communicating with ICU patients. Further details are available in Figure 1.

These apps were then assessed individually by two independent assessors through a preprepared electronic data collection form. Discrepancies between the two assessments were then resolved via a re-evaluation of the apps with the entire research team present.

Data were collected using Google Forms with data stored on a password-protected Google Drive.

In accordance with the National Statement on Ethical Conduct in Human Research, this is a preclinical quality improvement initiative that does not involve any personal details; therefore, ethics approval was not sought.<sup>19</sup>

## RESULTS

The apps tested are listed in Table 1. In addition, two other apps were reviewed. “Hawkeye Access” (Hawkeye Labs, Inc., Alamo, California) tracks eye movements to help the user browse the Internet, and “I Have Voice (ALS, MND)” allows the user to communicate using eye gaze. Both apps are not ICU specific and cover relatively few needs for patients admitted to intensive care. We did not evaluate these apps further.

All apps worked on iPad and were compatible with Apple Pencil. All the apps were free except for YoDoc, which required a one-time payment of \$14.99 (Australian Dollars); AT Elements ICU, which cost \$1.49 (AUD); and VidaTalk, which cost \$169 (US Dollars), annually.

The availability of features relevant for ICU patients in different apps is listed in Table 2. All but two apps were ICU specific (CALD Assist and Talkboard - Communicator). The majority of the apps had preloaded phrases for the patient to request for personal hygiene. Only two apps allowed for the patients to write using their fingers or a stylus—VidaTalk and YoDoc.

The languages supported by various apps, requests available to see someone, and requests available for comfort items are listed in Table 3. Of note, CALD Assist, Patient Communicator, VidaTalk, and YoDoc were available in more than eight languages, potentially serving the needs of units that have culturally and linguistically diverse (CALD) group of admitted patients and HCW. Most of the apps contained a variety of preloaded phrases to see someone (family, doctor, nurse, physical therapist, etc.), for help with a symptom (pain, breathlessness, etc.) or comfort item (e.g., turn on the light, blanket).

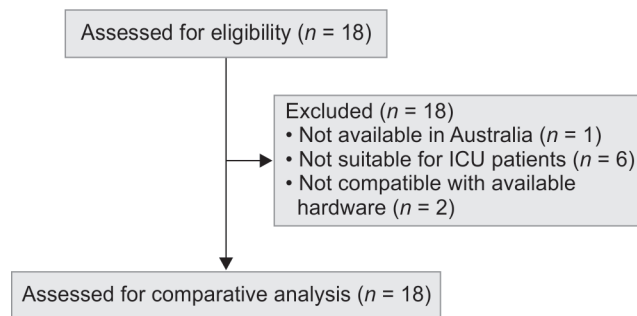


Fig. 1: Methodology of app selection

Table 1: Publication specifics of apps reviewed

App name (version*)	Apple platform (version)	Android platform	Publisher	"App Privacy" details on Apple App Store*
AT Elements ICU (2020)	iPad (9.0 or later) iPhone (9.0 or later)	No	Alexicom Tech LLC (Phoenix, Arizona)	No
CALD Assist (culturally and linguistically diverse) (version 3.3)	iPad (12.0 or later) iPhone (12.0 or later)	Yes	Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Canberra, Australia)	No
CommuniCare ICU (version 1.03)	iPad (9.0 or later)	No	CommuniCare OÜ (Tallinn, Estonia)	Yes
ICU Communication App (version 2.0.7)	iPad (10.0 or later)	No	Barnsley Hospital NHS Foundation Trust (Barnsley, South Yorkshire)	Yes
Patient Communicator (version 3.2.1)	iPad (10.0 or later) iPhone (10.0 or later)	Yes	Society of Critical Care Medicine (Mount Prospect, Illinois)	No
SmallTalk Intensive Care (version 4.7)	iPad (9.0 or later) iPhone (9.0 or later)	No	Lingraphica Inc. (Princeton, New Jersey)	Yes
Talkboard - Communicator (2020)	iPad (9.0 or later) iPhone (9.0 or later)	No	Nikola Software LLC (San Francisco, California)	No
VidaTalk (version 3.0.5)	iPad (OS 10.0 or later)	No	Vidata LLC (Annapolis, Maryland)	Yes
YoDoc (version 2.2)	iPad (9.0 or later) iPhone (9.0 or later)	Yes	Docapps LLC (Bengaluru, India)	Yes

\*"Year of access" if version not available

Four apps were deemed not suitable for routine ICU use. Some of the drawbacks of these apps that, in the opinion of the authors, make them unsuitable for routine ICU use are outlined in Table 4. The remaining apps had several attractive features, which we discuss below.

**DISCUSSION**

There is emerging evidence that the use of AAC improves communication.<sup>15,16</sup> However, at the time of publication, the use of apps to enhance communication is infrequent in ICUs. There are currently multiple apps available for communication in the ICU. Previous investigations have assessed the efficacy and usability of individual apps.<sup>20-25</sup> However, there has been no direct comparison of apps to date. The results of this assessment will provide information to HCWs on app suitability for routine ICU use.

Communication needs vary among communities, and different apps may best serve their unique requirements. We will outline the salient feature of notable apps for routine ICU use.

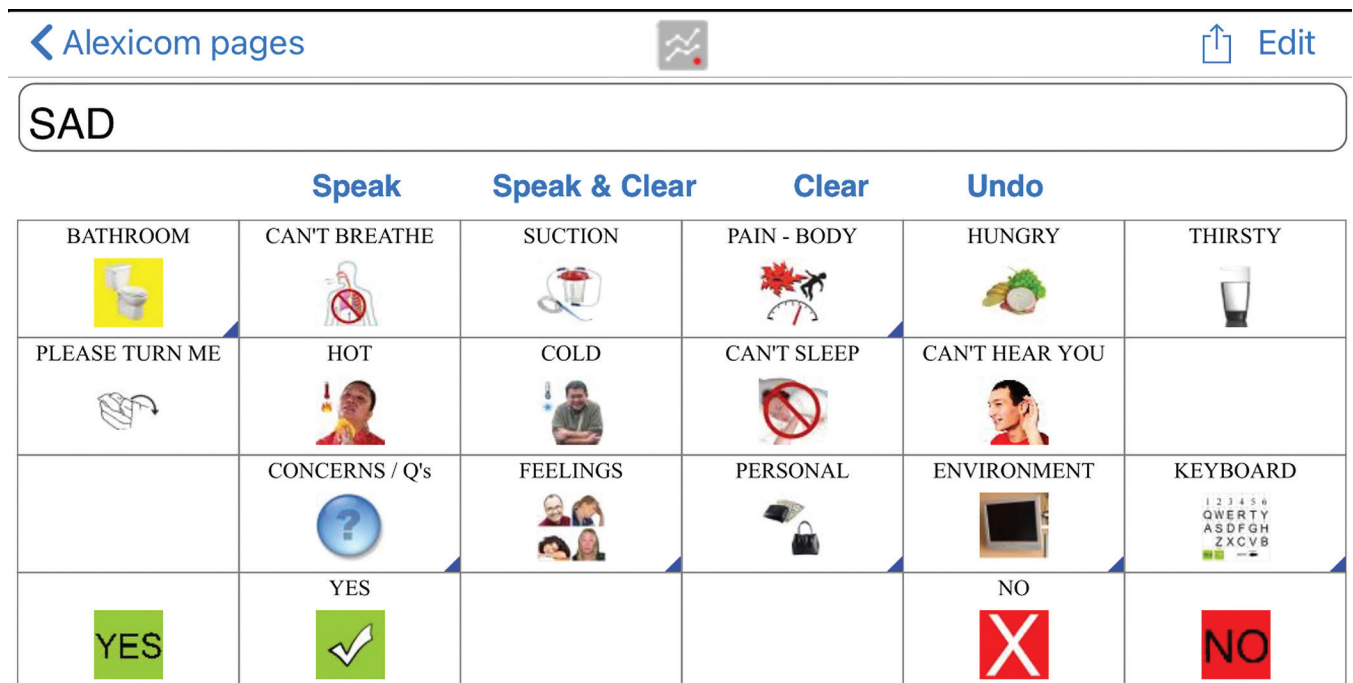
AT Elements ICU (1.49 Australian Dollars) was found to have a clear layout (Fig. 2) with a high number of relevant preset phrases, including one of the largest collections of personal care requests. The app is highly customizable and, therefore, could be adjusted to fit specific communication requirements. The ability to convert typed text to speech is an important patient empowering feature. The accompanying images are small and of low quality, detracting from the overall usability, but could be customized if required. AT Elements did not provide a simple apparatus for the pain to be accurately localized or characterized and was only available in English.

CommuniCare (free) presented many easy-to-read preset phrases, which covered a majority of the requests common in the ICU. It had an uncluttered interface with clear images associated

**Table 2:** ICU-specific features of the apps tested

App name	ICU specific	Text easily readable	Number of preset phrases	Request for personal hygiene	Converts prewritten text to speech	Converts typed text to speech	Allows drawing or scribble
AT Elements ICU	✓	✓	>100*	✓	✓	✓	✗
CALD Assist (culturally and linguistically diverse)	✗	✗	>100	✗	✓	✗	✗
CommuniCare ICU	✓	✓	>100	✓	✓	✓	✗
ICU Communication App	✓	✓	0-50*	✓	✓	✓	✗
Patient Communicator	✓	✗	0-50	✓	✗	✗	✗
SmallTalk Intensive Care	✓	✓	50-100	✓	✓	✗	✗
Talkboard - Communicator	✗	✓	0-50	✗	✗	✗	✗
VidaTalk	✓	✗	50-100	✓	✓	✓	✓
YoDoc	✓	✓	>100	✓	✓	✓	✓

\*Offers the option to create new preset phrases



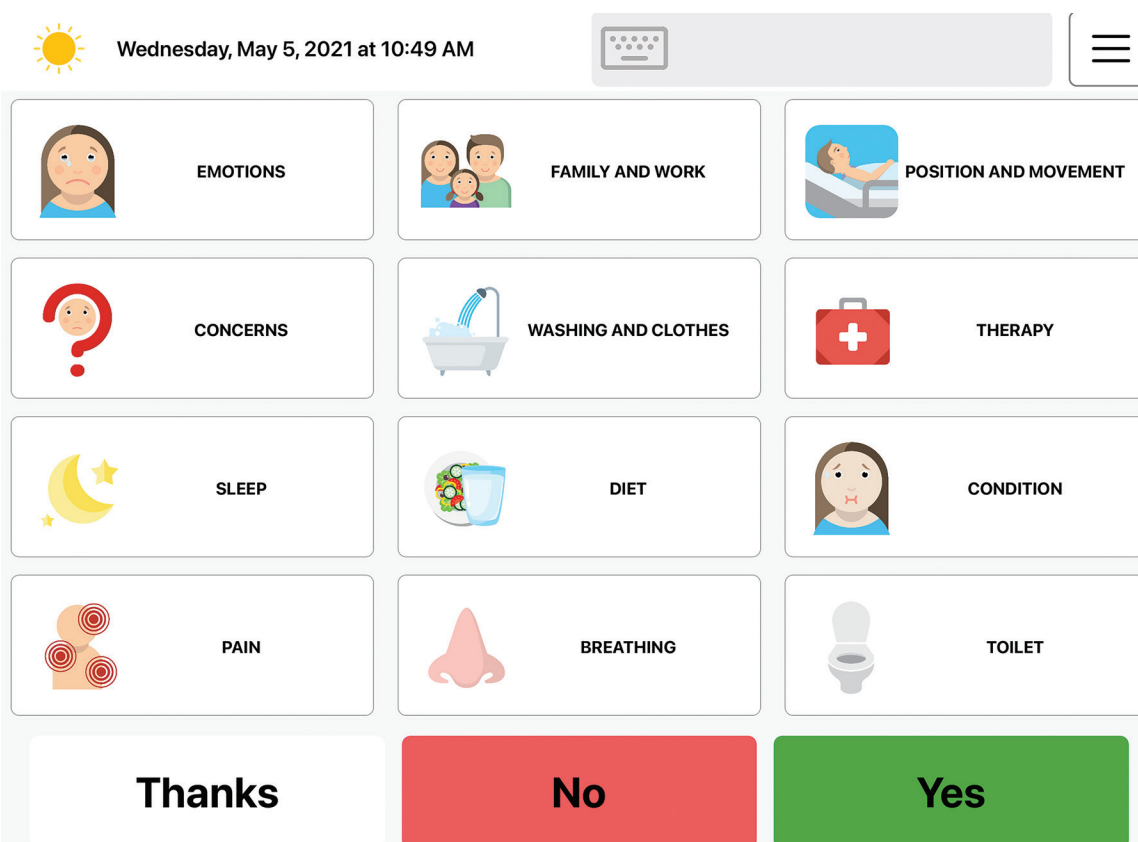
**Fig. 2:** App "AT Elements" with a screenshot of the available preset phrases

**Table 3:** Multilanguage availability, request to see someone, and request for comfort items available in different apps

<i>App name</i>	<i>Languages supported</i>		<i>Request to see someone</i>	<i>Personal care or comfort items</i>	
AT Elements ICU	English		Doctor Nurse Family Physiotherapist Religious leader Respiratory therapist	Analgesia Bedpan Dentures Food Glasses Hearing aid Lights on/off	Phone Suction Turn TV on/off Urinary bottle Wallet Water
CALD Assist	Arabic Cantonese Croatian English Greek	Italian Macedonian Mandarin Serbian Spanish Vietnamese	Nil	Nil	
CommuniCare ICU	English Estonian Russian		Doctor Nurse Family Physiotherapist Religious leader Respiratory therapist	Bedpan Lights on/off Sleep Analgesia Blanket Sedation Positioning	Medication Urinary bottle Suction Ventilator Pillow Personal hygiene
ICU Communication App	English		Doctor Family	Food Water	Toilet Suction
Patient Communicator	Arabic Chinese Czech Dutch English French German Hindi Italian	Lithuanian Portuguese Polish Russian Spanish Swedish Turkish Urdu	Doctor Nurse Family Physical therapist Religious leader	Analgesia Food Wash	Water Restroom Position
SmallTalk Intensive Care	English		Doctor Nurse Physiotherapist Respiratory therapist	Analgesia Antiemetic Bedpan Blanket Brush teeth Glasses Hearing aid	Lights on/off Pillow Suction TV on/off Urinary bottle Water
Talkboard - Communicator	English Spanish		Doctor Family	Blanket Glasses, Lights off	Pillow Water
VidaTalk	Arabic Bosnian Chinese Creole English Farsi French German Hindi Indonesian	Italian Japanese Korean Polish Portuguese Russian Spanish Tagalog Vietnamese	Doctor Nurse Family Physiotherapist Religious leader Respiratory therapist Social worker Occupational therapist	Analgesia Bedpan Blanket Glasses Hearing aid Ice Lights on/off Phone call Water	Pillow Suction Positioning TV on/off Urinary bottle Personal hygiene
YoDoc	Arabic Armenian Chinese English Farsi	Hindi Korean Russian Spanish	Doctor Nurse Family Occupational therapist Pharmacist Physiotherapist Religious leader Respiratory therapist Social worker Speech therapist	Analgesia Bedpan Blanket Glasses Ice Lights on/off Pillow	Suction Turn in bed TV on/off Urinary bottle Water

**Table 4:** Apps deemed relatively unsuitable for routine use in ICU

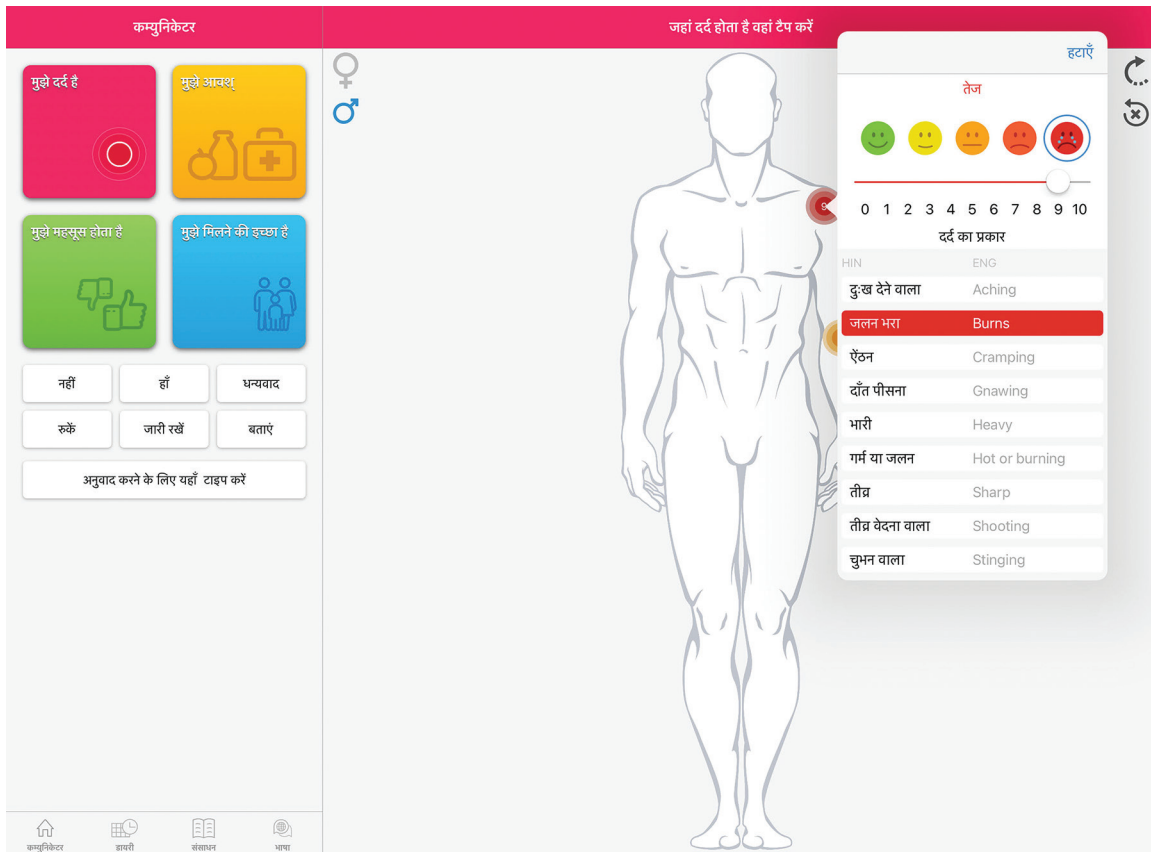
	<i>Name of app</i>	<i>Positive aspects</i>	<i>Drawbacks for routine ICU use</i>
1	CALD Assist	Excellent app for the HCW to communicate with the patients from culturally and linguistically diverse backgrounds	<ul style="list-style-type: none"> <li>• Small font size</li> <li>• App not designed for patients to initiate the conversation</li> <li>• Not ICU specific</li> <li>• Inability of patient to request for comfort items</li> <li>• Inability of patients to request to see someone (e.g., a family member)</li> </ul>
2	ICU Communication App	The app allows for the addition of phrases or words With customization and appropriate training, it may become a powerful learning tool	<ul style="list-style-type: none"> <li>• Available only in English</li> <li>• Absence of picture guide</li> <li>• Not intuitive for patient use</li> <li>• Limited preloaded phrases for comfort items</li> <li>• Limited ability to assess pain</li> </ul>
3	SmallTalk Intensive Care	Large, easy-to-read text with intuitive pictures specific for ICU patients. With some design improvements, this app may potentially become a useful communication tool	<ul style="list-style-type: none"> <li>• Available only in English</li> <li>• All preloaded phrases available only on a single page that needs to be scrolled up-down</li> <li>• It may be difficult for ICU patient with limited concentrating ability to find the desired prewritten phrase</li> </ul>
4	Talkboard - Communicator		<ul style="list-style-type: none"> <li>• Available only in English and Spanish</li> <li>• Limited number of prewritten phrases</li> <li>• Difficult to assess pain</li> <li>• Limited preloaded phrases for comfort items</li> </ul>

**Fig. 3:** App “CommuniCare ICU” homepage

with requests (Fig. 3). However, its primary limitation was its availability only in English, Russian, and Estonian. It also did not allow the user to draw or type words with a keyboard. Using its pain assessment tool, it was difficult to mark the site of pain.

Patient Communicator (free) is made available by the Society of Critical Care Medicine (USA). It had the highest number of languages (18) of any of the apps tested and had a good pain assessment feature (Fig. 4). It had additional features that may improve the





**Fig. 4:** App “Patient Communicator” by Society of Critical Care Medicine. This image demonstrates the pain assessment tool in Hindi. Other languages are available

care of long-term ICU patients, including a diary, glossary, and ICU stay booklet. The app lacked the ability to convert text to speech, limiting the feedback. Furthermore, the text size was smaller compared to other apps and deemed too small for practical use. There were no accompanying descriptive pictures with items of comfort or requests to see someone. It had very few preset requests, limiting patient-initiated communication exchange.

VidaTalk (USD 169 per annum) had many attractive features, including an extensive list of preset phrases relating to comfort, which are otherwise difficult to communicate nonverbally. The layout was straightforward, with clear, descriptive pictures, and it was also available in eight languages (Fig. 5). The tool for pain description was split across three tabs that may limit usability relative to other in-app tools. The text within VidaTalk is relatively small in size, which would likely not be suitable for patients with vision impairment. Furthermore, practical integration of the app in an ICU department requires consideration of cost vs its utilization. VidaTalk performed well at the point of analysis but was much more expensive when compared to other apps.

YoDoc (AUD 14.99) is translatable to nine languages (Fig. 6). The interface is stimulating without being distracting. YoDoc has been developed by Indian authors, and as such, the languages provided do not cover all the languages frequenting an Australian ICU. However, this was an issue with most of the apps assessed. The positive attributes of YoDoc are listed below:

- Intuitive and easy to use.
- User-friendly pain assessment tool (Fig. 7).

- Clear and informative pictures.
- Phrases can be organized by frequency of use.
- Adequate text size and contrast.
- Ninety-four preset spoken phrases.
- Allowance for typed words to convert to speech.
- Free text and drawing function.

Our study has several strengths. To our knowledge, this is the first study comparing the available ICU communication apps. Secondly, head-to-head comparisons of apps are difficult to make; however, we have provided a framework for these comparisons to be made (Tables 1 to 3).

Further, our study has several limitations. This is a bench study assessing the utility of an app prior to its implementation in the ICU. As a result, once an app is implemented, issues not previously noted will be identified and may change the app’s usability in the future. The needs of specific communities and ICUs vary, and others may find different apps to be better suited to their requirements. It is likely that the demographics may play a role in acceptance. The acceptance may be higher in communities with higher awareness of technology, literacy, and if there is a cultural and linguistic divide between the HCW and patient population (e.g., an app may be useful for a non-English speaking patient in an Australian ICU, or vice versa).

In the opinion of the authors, YoDoc is the most suitable app for routine use in the ICU. Among free apps, CommuniCare appears to be the most user-friendly but is only available in English, Russian, and Estonian. The immediate future direction from this study is to introduce a communication app in the ICU



Fig. 5: App “VidaTalk.” The side menu shows the list of languages available for use in patients from culturally and linguistically diverse backgrounds



Fig. 6: App “YoDoc.” The image shows preset phrases for comfort items, e.g., suction, written in both English and Hindi. More languages are available in this app

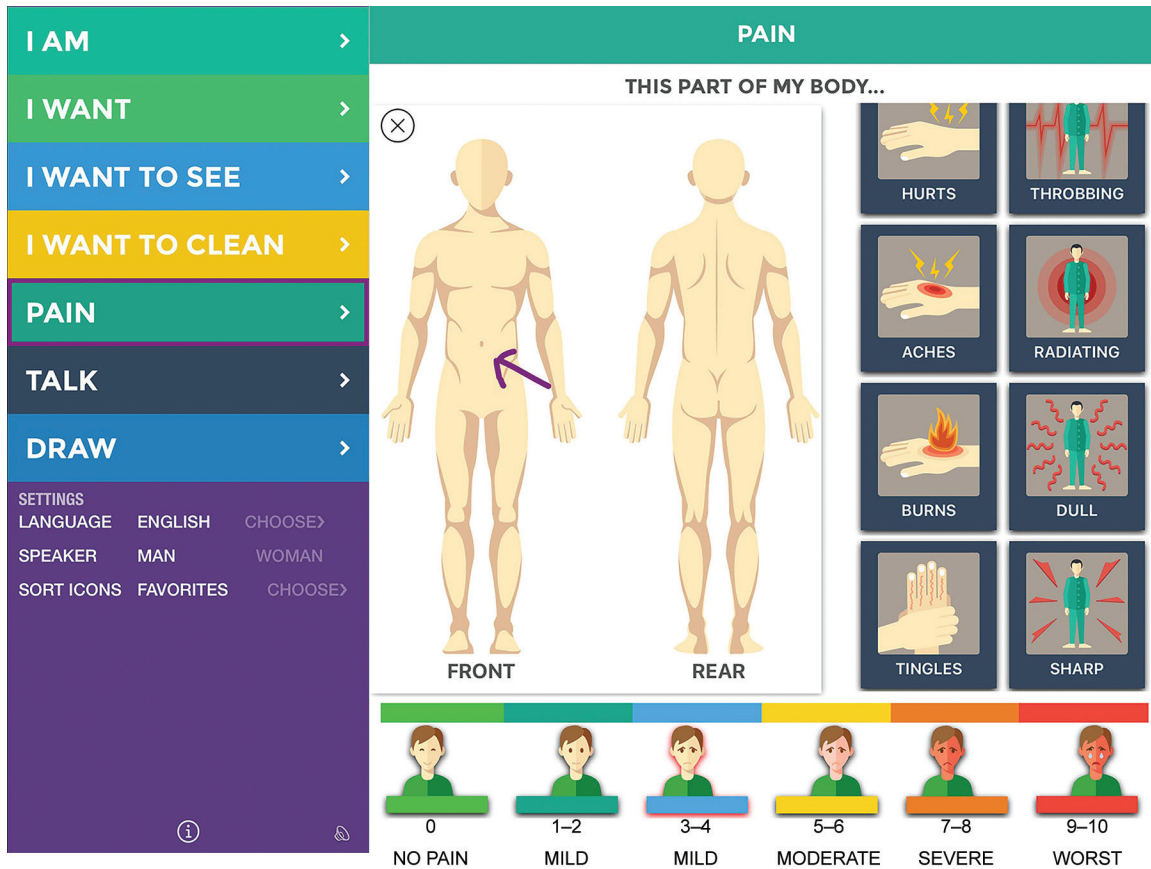


Fig. 7: App “YoDoc.” This image shows the pain assessment tool. The arrow may be drawn by the patient to indicate the site of pain

and assess its effect on ease of communication, need for sedation, and incidence of delirium.

## CONCLUSION

There are many high-quality apps available to assist with patient-initiated communication exchange in the ICU. These allow patients to make requests that would otherwise be difficult.

These apps make communication possible between HCWs and culturally and linguistically diverse patients. This study provides a guide for readers to choose the app most suited for their needs.

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