



# The Effectiveness of a Virtual Interprofessional Teamwork Simulation Exercise for Interprofessional Students at the University of Hawaii

Aida Wen, MD<sup>1</sup>; Lorrie Wong, PhD, MS, RN, CHSE-A<sup>2</sup>; Robin Arndt, MSW, LSW<sup>3</sup>; Sheri Tokumaru, PharmD<sup>4</sup>; Alan Katz, MD, MPH<sup>3</sup>

Monica Esquivel, PhD, RDN, CSSD<sup>5</sup>; Alison Miyasaki, MS, APRN<sup>2</sup>; Chad Kawakami, PharmD<sup>3</sup>; Kamal Masaki MD<sup>1</sup>.

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ABSTRACT
<p><b>Introduction:</b> The University of Hawaii Health Sciences Schools have been conducting the Hawaii Inter- Professional Team Collaboration Simulation (HIPTCS) exercise since 2014. It was originally designed to have most students work together at one site, and collaborate with students from one discipline (pharmacy) at a distant site. Due to the COVID-19 pandemic, this exercise was converted to an entirely virtual format.</p> <p><b>Objective:</b> To compare the efficacy of the entirely virtual format of HIPTCS to the original format, and to determine its impact on interprofessional core competencies.</p> <p><b>Methods:</b> The HIPTCS exercise was provided on two days to accommodate the volume of students at the University of Hawaii schools. During the 2019-20 academic year, 122 students from different professions participated in the exercise mostly in-person (Pharmacy students were the only group to participate virtually) in February 2020 (pre-COVID). For the April 2020 session (during COVID), a different cohort of 113 interprofessional students, all participated via video conferencing. This included third-year medical, nursing and pharmacy students, and students from social work and dietetics. Students were assigned pre-work: watching a video about interprofessional teamwork and reviewing clinical information about a complex geriatrics case. In the online version, different teams of students and facilitators were managed with breakout rooms. The exercise began with a virtual icebreaker team puzzle. Faculty from all 5 schools debriefed with students about effective teamwork strategies to apply in the next section. The students then worked together to develop a discharge plan and participated in a simulated family meeting with an actor playing the role of the patient's family member. After the exercise, interprofessional faculty again provided structured co-debriefing to highlight principles of effective teamwork. For evaluation, we used the Interprofessional Collaborative Competency Attainment Survey (ICCAS), which is a reliable and validated instrument that assesses self-rated interprofessional collaborative practice core competencies with 20 items rated on a 5-point Likert scale. We added one additional question about cultural competency. We used a retrospective pre-post design, and changes in scores were analyzed using paired T-tests. We also collected qualitative data regarding distance technology and the impact of the exercise.</p> <p><b>Results:</b> The number of students participating in person in February 2020 was n=122, and the number participating via videoconferencing in April 2020 was n=113. We found significant improvements in all interprofessional education (IPE) core competency categories (e.g. values, roles and responsibilities, teamwork, communication, etc.) for both the in-person cohort and the online cohort (all p&lt;0.0001). There were no significant differences in all ICCAS item scores between the in-person students and online students. Students were also given the opportunity to evaluate the activity (Likert Scale 1-5, with 5 being the best). Students were very satisfied with their ability to work through the simulations (mean 4.15 ± 0.71) and stated that their ability to collaborate interprofessionally improved (mean 4.28 ± 0.67). Comparison of these measures were not statistically different, whether in person or online. However, when asked if participation in the activity would affect their future practice (mean 3.99 ± 0.89), students participating online (3.84 ± 0.92) had lower scores than those who participated in person (4.13 ± 0.83) (p=0.01). For both in person and on-line cohorts, under qualitative comments, students described similar themes regarding the most helpful aspect of the simulation experience was "collaborating with other health professions; learning professional roles" with the second being "Working with Actors; more realistic actor feedback." Students also provided qualitative comments regarding the least helpful aspects of the experience. For the in person cohort, they described "desire for smaller group size so everyone can participate," and challenges of telepresence (e.g. "being ignored") and, the "need for clearer instructions." For the online cohort, they also described "desire for smaller group size so everyone can participate," and challenges of telepresence (e.g. "knowing when to speak," "video lag"), and "time constraints for prep work activities and instructions."</p> <p><b>Discussion:</b> Building on previous experiences, we were able to convert the HIPTCS simulation to a completely virtual format during the COVID-19 pandemic. We were still able to achieve significant improvements in all IPE core competency categories for both the in person and online cohorts, with students experiencing high levels of satisfaction.</p>

INTRODUCTION
<ul style="list-style-type: none"><li>• The University of Hawaii Health Sciences Schools have been conducting the Hawaii Inter-Professional Team Collaboration Simulation (HIPTCS) exercise since 2014</li><li>• Originally designed with most students working at one site, collaborating with pharmacy students at a distant site</li><li>• Due to the COVID-19 pandemic, this exercise was converted to an entirely virtual format</li></ul>

OBJECTIVE
To compare the efficacy of the entirely virtual format of HIPTCS to the original format, and to determine its impact on interprofessional core competencies

METHODS
<p><b>Study Population (Total Students, N=235):</b></p> <ul style="list-style-type: none"><li>• 78 pharmacy (3<sup>rd</sup> year, on a neighbor island)</li><li>• 71 medicine (3<sup>rd</sup> year)</li><li>• 21 nursing (3<sup>rd</sup> semester)</li><li>• 4 social work (on clinical rotations)</li><li>• 7 dietetics (mostly 4<sup>th</sup> or 5<sup>th</sup> year)</li></ul> <p><b>Case:</b> An elderly patient admitted to the hospital with falls and polypharmacy who needs a safe discharge plan</p> <p><b>Pre-Work:</b> Students are asked to watch an interdisciplinary team rounds video, listen to an audio-clip of a monologue by the patient, review the patient chart</p> <p><b>Simulation Exercise Format:</b></p> <p><b>February 2020 (Pre-COVID), n=122</b></p> <ul style="list-style-type: none"><li>• Students participated mostly in person except for Pharmacy, who participated via videoconferencing from Hilo</li><li>• Some facilitators were in person, some remote</li><li>• 5 rooms running in the morning, and 5 in the afternoon</li></ul> <p><b>April 2020 (During COVID), n=113</b></p> <ul style="list-style-type: none"><li>• All students and facilitators participated via videoconferencing</li><li>• 5 rooms running in the morning, and 5 in the afternoon</li></ul> <p><b>Part I (40 min) – Icebreaker:</b></p> <ul style="list-style-type: none"><li>• Introductions (10 min): name, profession, interesting fact about self</li><li>• Team online puzzle (10 min): determine team leader, designate one scribe to move puzzle pieces, and timer</li><li>• Debrief icebreaker (20 min): communication and teamwork strategies</li></ul> <p><b>Part II (30 min) – Interprofessional Team Meeting:</b></p> <ul style="list-style-type: none"><li>• Goal: to obtain consensus on a problem list, top 3 priorities, and develop a preliminary plan of care to be discussed with the family</li></ul> <p><b>Part III (30 min) – Family meeting:</b></p> <ul style="list-style-type: none"><li>• With actor as family member, 1 nursing, 1 pharmacy, 1 social work, 1 dietetics, &amp; 1 medical student</li><li>• Goal: to determine the family's priorities and negotiate a mutually agreeable patient/family centered plan of care for safe discharge</li></ul> <p><b>Part IV (40 min) - Debriefing:</b></p> <ul style="list-style-type: none"><li>• Each team of students debriefs with facilitators, represented by Medicine, Nursing, Pharmacy and Social Work faculty</li></ul> <p><b>Evaluation – Online Survey:</b></p> <ul style="list-style-type: none"><li>• Interprofessional Collaborative Competency Attainment Survey (ICCAS)<ul style="list-style-type: none"><li>• 20-question validated survey used as a self-assessment</li><li>• 1 additional question related to cultural diversity</li><li>• 5-point Likert scale</li><li>• Retrospective pre-post format</li></ul></li><li>• The evaluation also asked questions about impact on their ability to collaborate interprofessionally and satisfaction with the workshop on a 5-point Likert scale</li><li>• Included open-ended questions about what was most helpful, and how the experience could be improved</li></ul> <p><b>Statistical Methods:</b></p> <ul style="list-style-type: none"><li>• ICCAS scores were considered as continuous variables</li><li>• Each question was analyzed separately and by categories based on interprofessional practice competencies</li><li>• An overall average score was also generated</li><li>• Paired t-tests compared changes in scores before and after workshop</li><li>• Top themes were extracted from the open-ended questions</li></ul>

RESULTS									
ICCAS Scores – Pre-Post Comparisons Paired T-Tests (Mean) N=235									
Questions - Please rate your ability for each of the following statements BEFORE & AFTER: [1-5 Scale: 1=Much worse now; 2=Somewhat worse now; 3>About the same; 4=Somewhat better now; 5=Much better now]	Pre Score Mean			Post Score Mean			Change Score Mean		P value
Communication Summary (Q1-5)	3.67			4.29			0.62		<0.0001
Collaboration Summary (Q6-8)	3.52			4.34			0.83		<0.0001
Roles and Responsibilities Summary (Q9-12)	3.61			4.38			0.76		<0.0001
Collaborative Pt/Family-Centered Approach (Q13-15)	3.54			4.40			0.86		<0.0001
Conflict Management/Resolution (Q16-18)	3.85			4.45			0.60		<0.0001
Team Functioning (Q19-20)	3.57			4.33			0.76		<0.0001
MEAN TOTAL ICCAS SCORE (Q1-20)	3.63			4.36			0.73		<0.0001
Embrace cultural diversity/individual differences	3.79			4.34			0.55		<0.0001
ICCAS Scores – Comparisons Between In-Person (N=122) & Online (N=113) Paired T-Tests (Means)									
Questions - Please rate your ability for each of the following statements BEFORE & AFTER: [1-5 Scale: 1=Much worse now; 2=Somewhat worse now; 3>About the same; 4=Somewhat better now; 5=Much better now]	Pre Score Mean			Post Score Mean			Change Score Mean		
	In-Person	Online	P value	In-Person	Online	P value	In-Person	Online	P value
Communication Summary (Q1-5)	3.68	3.65	0.76	4.32	4.26	0.44	0.64	0.61	0.71
Collaboration Summary (Q6-8)	3.51	3.52	0.93	4.33	4.36	0.71	0.82	0.84	0.83
Roles and Responsibilities (Q9-12)	3.60	3.63	0.71	4.37	4.39	0.88	0.77	0.75	0.80
Pt/Family-Centered Approach (Q13-15)	3.54	3.55	0.88	4.43	4.37	0.48	0.89	0.82	0.47
Conflict Management (Q16-18)	3.85	3.85	0.95	4.47	4.43	0.61	0.62	0.58	0.69
Team Functioning (Q19-20)	3.60	3.53	0.50	4.35	4.31	0.60	0.75	0.77	0.80
MEAN TOTAL ICCAS SCORE (Q1-20)	3.63	3.63	0.96	4.37	4.35	0.71	0.74	0.72	0.78
Embrace cultural diversity	3.79	3.79	0.99	4.40	4.27	0.16	0.61	0.49	0.17
Evaluation Questions After IPE Activity									
Evaluation Questions	All Students Mean ± SD (N=235)		Comparison of Evaluation Scores (T-Tests)						
			In-Person (N=122)	Online (N=113)		P Value			
Compared to the time before the learning activities, would you say your ability to collaborate interprofessionally is... [1-5 Scale: (Much worse now, somewhat worse now, about the same, somewhat better now, much better now)]	4.28 ± 0.67		4.35 ± 0.67		4.19 ± 0.67		0.0712		
How much do you think your participation in this activity will affect your future practice? [1-5 Scale: (1=Not at all, 2=Slightly, 3=Moderately, 4=Very, 5=Extremely)]	3.99 ± 0.89		4.13 ± 0.83		3.84 ± 0.92		0.0118		
How satisfied were you with your ability to work through the simulations? [1-5 Scale: (1=Not at all, 2=Fair, 3=Neutral, 4=Satisfied, 5=Extremely satisfied)]	4.15 ± 0.71		4.17 ± 0.76		4.12 ± 0.66		0.6036		

CONCLUSIONS
<ul style="list-style-type: none"><li>• At the University of Hawaii, we were able to successfully convert the HIPTCS simulation to a completely virtual format during the COVID-19 pandemic</li><li>• We were still able to achieve significant improvements in all IPE core competency categories for both the in-person and online cohorts</li><li>• All disciplines experienced high levels of satisfaction</li></ul>
DISCUSSION
<p><b>Strengths</b></p> <ul style="list-style-type: none"><li>• Innovative changes were made quickly to adapt to the COVID-19 pandemic</li><li>• Validated tool (ICCAS) to assess interprofessional competencies</li><li>• We believe that the strength of the exercise that enabled both in-person and entirely virtual formats to be equally effective was the repeated opportunity for debriefing, feedback, and practice of IPE skills (ice-breaker activity, team meeting and family meeting)</li></ul> <p><b>Limitations</b></p> <ul style="list-style-type: none"><li>• Evaluation data only included self-evaluation from students</li><li>• We were not able to collect objective data about quality of interprofessional team collaboration, as well as individual team members' performance</li></ul> <p><b>Areas for Improvement</b></p> <ul style="list-style-type: none"><li>• The question about whether participation in the activity would affect their future practice should be explored</li><li>• While both cohorts stated that their ability to collaborate interprofessionally was somewhat better after the event, virtual learners expressed lower benefit</li><li>• Reasons were unclear - perhaps they felt that virtual team meetings would not be relevant in the future after pandemic restrictions were lifted</li><li>• Perhaps incorporating more time into the event, to allow for clearer instructions, and online communication (time to unmute, use of Google docs, etc.)</li><li>• Objectively measuring competency in interprofessional collaborative skills by facilitator observation</li></ul> <p><b>Opportunities</b></p> <ul style="list-style-type: none"><li>• The Virtual format allows students to continue interprofessional education despite COVID-19 physical distancing requirements</li><li>• This exercise allowed interactions with other disciplines, giving students the opportunity to practice virtual teamwork skills, which may be required even after pandemic restrictions are lifted after they graduate</li><li>• Virtual interactions with student actors enabled healthcare students to practice telemedicine skills, which may be utilized even after pandemic restrictions are lifted</li></ul> <p><b>Disclosures:</b> The authors have no relevant financial disclosures to report.</p>

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# Introduction

- The University of Hawaii Health Sciences Schools have been conducting the Hawaii Inter-Professional Team Collaboration Simulation (HIPTCS) exercise since 2014
- Originally designed with most students working at one site, collaborating with pharmacy students at a distant site
- Due to the COVID-19 pandemic, this exercise was converted to an entirely virtual format

# Objective

- To compare the efficacy of the entirely virtual format of HIPTCS to the original format, and to determine its impact on interprofessional core competencies

# Methods

- **Study Population (Total Students, N=235):**
  - 78 pharmacy (3<sup>rd</sup> year, on a neighbor island)
  - 71 medicine (3<sup>rd</sup> year)
  - 21 nursing (3<sup>rd</sup> semester)
  - 4 social work (on clinical rotations)
  - 7 dietetics (mostly 4<sup>th</sup> or 5<sup>th</sup> year)
- **Case:** An elderly patient admitted to the hospital with falls and polypharmacy who needs a safe discharge plan
- **Pre-Work:** Students are asked to watch an interdisciplinary team rounds video, listen to an audio-clip of a monologue by the patient, review the patient chart

# Methods: Comparison Groups

## February 2020 (Pre-COVID), n=122

- Students participated mostly in person except for Pharmacy, who participated via videoconferencing from Hilo
- Some facilitators were in person, some remote
- 5 rooms running in the morning, and 5 in the afternoon

## April 2020 (During COVID) , n=113

- All students and facilitators participated via videoconferencing
- 5 rooms running in the morning, and 5 in the afternoon

# Methods: Simulation Exercise Format

## **Part I (40 min) – Icebreaker:**

- Introductions (10 min): name, profession, interesting fact about self
- Team online puzzle (10 min): determine team leader, designate one scribe to move puzzle pieces, and timer
- Debrief icebreaker (20 min): communication and teamwork strategies

## **Part II (30 min) – Interprofessional Team Meeting:**

- Goal: to obtain consensus on a problem list, top 3 priorities, and develop a preliminary plan of care to be discussed with the family

## **Part III (30 min) – Family meeting:**

- With actor as family member, 1 nursing, 1 pharmacy, 1 social work, 1 dietetics, & 1 medical student
- Goal: to determine the family's priorities and negotiate a mutually agreeable patient/family centered plan of care for safe discharge

## **Part IV (40 min) - Debriefing:**

- Each team of students debriefs with facilitators, represented by Medicine, Nursing, Pharmacy and Social Work faculty

# Evaluation: Online Survey

- Interprofessional Collaborative Competency Attainment Survey (ICCAS)
  - 20-question validated survey used as a self-assessment
  - 1 additional question related to cultural diversity
  - 5-point Likert scale
  - Retrospective pre-post format
- The evaluation also asked questions about impact on their ability to collaborate interprofessionally and satisfaction with the workshop on a 5-point Likert scale
- Included open-ended questions about what was most helpful, and how the experience could be improved

# Evaluation: Statistical Methods

- ICCAS scores were considered as continuous variables
- Each question was analyzed separately and by categories based on interprofessional practice competencies
- An overall average score was also generated
- Paired *t-tests* compared changes in scores before and after workshop
- Top themes were extracted from the open-ended questions

# Results: Overall Competency Scores

**ICCAS Scores – Pre-Post Comparisons Paired T-Tests (Mean) N=235**

Questions - Please rate your ability for each of the following statements BEFORE & AFTER: [1-5 Scale: 1=Much worse now; 2=Somewhat worse now; 3=About the same; 4=Somewhat better now; 5=Much better now]	Pre Score Mean	Post Score Mean	Change Score Mean	P value
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Team Functioning (Q19-20)	3.57	4.33	0.76	<0.0001
<b>MEAN TOTAL ICCAS SCORE (Q1-20)</b>	<b>3.63</b>	<b>4.36</b>	<b>0.73</b>	<b>&lt;0.0001</b>
Embrace cultural diversity/individual differences	3.79	4.34	0.55	<0.0001

# Results: Comparisons

ICCAS Scores – Comparisons Between In-Person (N=122) & Online (N=113) Paired T-Tests (Means)									
Questions - Please rate your ability for each of the following statements BEFORE & AFTER: [1-5 Scale: 1=Much worse now; 2=Somewhat worse now; 3=About the same; 4=Somewhat better now; 5=Much better now]	Pre Score Mean			Post Score Mean			Change Score Mean		
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<b>MEAN TOTAL ICCAS SCORE (Q1-20)</b>	<b>3.63</b>	<b>3.63</b>	<b>0.96</b>	<b>4.37</b>	<b>4.35</b>	<b>0.71</b>	<b>0.74</b>	<b>0.72</b>	<b>0.78</b>
Embrace cultural diversity	3.79	3.79	0.99	4.40	4.27	0.16	0.61	0.49	0.17

# Results: Impact and Satisfaction

## Evaluation Questions After IPE Activity

Evaluation Questions	All Students Mean $\pm$ SD (N=235)	Comparison of Evaluation Scores (T-Tests)		
		In-Person (N=122)	Online (N=113)	P Value
Compared to the time before the learning activities, would you say your ability to collaborate interprofessionally is... [1-5 Scale: (Much worse now, somewhat worse now, about the same, somewhat better now, much better now)]	4.28 $\pm$ 0.67	4.35 $\pm$ 0.67	4.19 $\pm$ 0.67	0.0712
How much do you think your participation in this activity will affect your future practice? [1-5 Scale: (1=Not at all, 2=Slightly, 3=Moderately, 4=Very, 5=Extremely)]	3.99 $\pm$ 0.89	4.13 $\pm$ 0.83	3.84 $\pm$ 0.92	<b>0.0118</b>
How satisfied were you with your ability to work through the simulations? [1-5 Scale: (1=Not at all, 2=Fair, 3=Neutral, 4=Satisfied, 5=Extremely satisfied)]	4.15 $\pm$ 0.71	4.17 $\pm$ 0.76	4.12 $\pm$ 0.66	0.6036

# Conclusions

- At the University of Hawaii, we were able to successfully convert the HIPTCS simulation to a completely virtual format during the COVID-19 pandemic
- We were still able to achieve significant improvements in all IPE core competency categories for both the in-person and online cohorts
- All disciplines experienced high levels of satisfaction

# Discussion: Strengths

- Innovative changes were made quickly to adapt to the COVID-19 pandemic
- Validated tool (ICCAS) to assess interprofessional competencies
- We believe that the strength of the exercise that enabled both in-person and entirely virtual formats to be equally effective was the repeated opportunity for debriefing, feedback, and practice of IPE skills (ice-breaker activity, team meeting and family meeting)

# Discussion: Limitations

- Evaluation data only included self-evaluation from students
- We were not able to collect objective data about quality of interprofessional team collaboration, as well as individual team members' performance

# Discussion: Areas for Improvement

- The question about whether participation in the activity would affect their future practice should be explored
- While both cohorts stated that their ability to collaborate interprofessionally was somewhat better after the event, virtual learners expressed lower benefit
- Reasons were unclear - perhaps they felt that virtual team meetings would not be relevant in the future after pandemic restrictions were lifted
- Perhaps incorporating more time into the event, to allow for clearer instructions, and online communication (time to unmute, use of Google docs, etc.)
- Objectively measuring competency in interprofessional collaborative skills by facilitator observation

# Discussion: Opportunities

- The Virtual format allows students to continue interprofessional education despite COVID-19 physical distancing requirements
- This exercise allowed interactions with other disciplines, giving students the opportunity to practice virtual teamwork skills, which may be required even after pandemic restrictions are lifted after they graduate
- Virtual interactions with student actors enabled healthcare students to practice telemedicine skills, which may be utilized even after pandemic restrictions are lifted