Effects of Simulation Training of Interprofessional Collaboration: Baseline and Follow-Up Measurement of Clinician-Reported IPC Behaviour

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Study objective

Development and evaluation of simulation as a means of teaching health professionals IPC competencies.

Rationale

IPC is considered beneficial and currently a significant health policy agenda but there is little post-licensure training available for healthcare teamwork in the practice setting; simulation may be one method.

Simulation description

Simulation sessions using scenarios (table-top and lab-based) developed and led by an experienced clinical simulation leader.

Participants

Regulated health care professionals (n=154) working in a community hospital in the Greater Toronto Area.

Design

- An uncontrolled intervention study with longitudinal self- and proxy-report survey data collection.
- Health care professionals took one group simulation training session. 12 group training sessions held between June-December, 2008. Group sizes ranged from 5 to 15.
- Data collection: self-administered IPC and teamwork scales completed at 3 times:
  - Time1 measures completed on the same day as, & immediately before the simulation session;
  - Time 2 measures completed approximately 14 days after Time1 training;
  - Time 3 measures completed about 6 weeks after Time1 training.

Note: Qualitative data collected will be presented in a separate report.

Measures

5 scales/subscales adapted from previously used instruments:

Nurses' Opinion Questionnaire (Adams, Bond, & Arber, 1995) - adapted IPC scale based on nurse-physician relations subscales; adapted for use with 3 healthcare groups – nurses, physicians, other professionals – written in a round-robin format – a group/profession member assesses members of the other 2 groups in the clinical setting on IPC behaviours and practices, e.g., nurses' items target physicians and other professionals; physicians' items target nurses and other professionals, etc.; 14 items with 4 response options numbered 1-4; strongly disagree/disagree/agree/strongly agree.

Nursing Work Index-Revised (Aiken & Patrician, 2000) - Nurse-Physician Relations subscale – 3 items – 4 response options numbered 1-4; same as IPC.

Attitudes Toward Health Care Teams Scale (Heinemann et al., 1999) - 3 subscales: Team Value, 11 items; Team Efficiency, 5 items; Shared Leadership with Physicians, 5 items; responses on 1-6 scales.

Plus: Demographic/background data: gender (F/M); provide direct patient care? (Y/N); manage staff? (Y/N); post-licensure experience (<1 yr., 1-5 yrs., 6-10 yrs., >10 yrs.); employment (FT, PT, casual); profession (nurse, physician, other professional – subcategories); clinical department.

Analysis

- Internal consistency reliability of all subscales was examined for all data collection waves.
- Multilevel regression models for growth curves: unconditional means model, unconditional growth model.
- Random effects model to examine mean scale scores by "leadership capacity" at 3 waves.

Results

1. Descriptive statistics : 154 participants in at least one wave of data (Time 1 to Time 3). Most participants nurses & most >10 yrs. post-licensure experience. 85% completed most or all measures at all 3 times.

2. Internal consistency reliability of measures: Reliability of IPC scale data is almost uniformly acceptable at all waves; some problems with physicians' ratings. Acceptable reliability for Nursing Work Index and Team Value subscales. Reliability of Team Efficiency and Shared Leadership scales was slightly below conventional acceptable/reported values.

3. Unconditional means model (Table 1):
   (i) Grand mean of scale scores for all scales (and maximum scale scores for reference), for various rater combinations, and
   (ii) Intraclass correlation coefficient (ICC) - proportion of total outcome variation that lies "between" persons, i.e., the percent of total variation in a score that is due to differences between nurses, or doctors, or doctors and nurses combined, etc., over time.
   - majority of variation exists between persons (usually 60% - 70%); indicates more heterogeneity between persons than there is within-person change over time, i.e., most important predictors of outcomes (scale scores) probably are characteristics that vary between individuals instead of within individuals over time. Thus, time-stable predictors probably more important than time-varying predictors.
   - exception is doctors, who show considerably more within-person change due to either nurses or other professionals, particularly in their ratings of nurses and other professionals on the IPC scale and their score on the Shared Leadership scale. MDs are more homogeneous as a group, but more heterogeneous in within-person variation, which is individual change over time. BUT – MD sample is small.

4. Unconditional growth model (Table 2): *Time* is the most important predictor in the model.
   - Negative correlations between initial status and change over time (but not statistically different from zero), however *direction of change* is of interest.
   - Lower initial scale scores associated with larger positive changes in scale scores over time. Higher initial scores associated with smaller changes over time.
   - Correlation for the TeamValue scale when other professionals are respondents (r=0.91) and Shared Leadership among all respondents (r=-0.58). For other professionals, greater gains on Team Value seen among those with initially higher scores. Note that the significant negative relationship for Shared Leadership indicates greater change over time in those with initially lower scores – a desirable outcome.

5. Average scale scores by "leadership capacity" over time (Table 3):
   - Sub-group analysis by creation of composite variable defined as "leadership capacity": A *count* variable (1 point each) based on 3 characteristics of seniority: (1) not giving direct patient care; (2) managing staff; (3) > 5 years of post-licensure experience. Results in possible value of 0-3.
   - Entered as a predictor in a regression model for scores on 3 attitudes subscales: Attitudes Toward…: Team Value, Team Efficiency, Shared Leadership (higher scores = greater agreement with the measured attitude).
   - **Team Value** (Table 3): Initial differences at Time1 that did not persist over time; highest average score was for highest score on leadership capacity variable (=3). Lower scores involved leadership=2.
   - **Team Efficiency** (Table 3): Differences occurred at Time 2 but gone at Time 3. Highest average score was for highest score on leadership capacity variable, and lowest was for leadership = 2. General trend at Time 2 was toward lower values of leadership capacity having higher average scores (0=23.5, 1=22.5, 2=21.1).
   - **Shared Leadership** (Table 3): Differences at all 3 times, the common group involved was the highest-ranked leadership capacity group. General trend is lowest leadership score to have higher average scores on the scale (Time1: 20.3 / 18.0 / 18.9; Time 2: 19.1 / 17.3 / 18.9; Time 3: 18.7 / 18.0 / 18.6). Exception (again) is for highest leadership rank to have highest avg score (24.0, 22.9).

Table 1: IPC & Nurse-Physician Relations Behaviour, and Attitudes to Team Value, Team Efficiency, and Shared Leadership: Unconditional Means Model Results

Scale (rater → targets)	Grand Mean	Maximum Scale Score	ICC (variation that is between persons, %)
IPC			
N,OP → D	36.2	56	70
N → D	36.1	*	70
OP → D	36.4	*	71
D → N	41.4	*	45
D,N → OP	39.9	*	62
N → OP	39.7	*	67
OP → N	40.4	*	68
D → OP	40.5	*	29
NWI: (N → D)	8.3	12	61
Team Value*			
All	55.5	66	70
Nurses	55.4	*	69
Other Professionals	56.9	*	69
Doctors	51.6	*	64
Team Efficiency*			
All	22.3	30	59
Nurses	22.0	*	62
Other Professionals	23.3	*	49
Doctors	21.1	*	53
Shared Leadership*			
All	18.3	30	70
Nurses	18.7	*	69
Other Professionals	18.3	*	73
Doctors	15.5	*	43

*For Team Value, Team Efficiency, and Shared Leadership: 'respondents', not 'raters'

Table 2: Measures of Change in IPC, Nurse-Physician Relations, & Attitudes over Time: Unconditional Growth Model Results

Scale (rater → targets)	Correlation: Initial status and true change	Within-person Variation due To *TIME*
IPC		
N,OP → D	-0.19	.03
N → D	+	+
OP → D	-0.43	.15
N → OP	-0.11	.18
OP → N	+	+
NWI: (N → D)	+	+
Team Value^		
All	0.02	.09
Nurses	-0.21	.18
Other Professionals	0.91*	.13
Team Efficiency^		
All	-0.43	.02
Nurses	+	+
Other Professionals	-0.60	.19
Shared Leadership^		
All	-0.58*	.10
Nurses	-0.71	.08
Other Professionals	-0.33	.20

* p<.05; +=non-estimable
^ For Team Value, Team Efficiency, and Shared Leadership: 'respondents', not 'raters'

Table 3: Leadership Capacity: Statistically significant differences of average scales scores, by scale and Time

Comparison Values of Leadership Capacity		Time1	Time2	Time3
Team Value				
0	1	n.s.	n.s.	n.s.
0	2	* (56.2, 53.8)	n.s.	n.s.
0	3	n.s.	n.s.	n.s.
1	2	* (56.2, 53.8)	n.s.	n.s.
1	3	n.s.	n.s.	n.s.
2	3	* (53.8, 59.6)	n.s.	n.s.
Team Efficiency				
0	1	n.s.	n.s.	n.s.
0	2	n.s.	* (23.5, 21.1)	n.s.
0	3	n.s.	n.s.	n.s.
1	2	n.s.	* (22.5, 25.8)	n.s.
1	3	n.s.	* (22.5, 25.8)	n.s.
2	3	n.s.	* (21.1, 25.8)	n.s.
Shared Leadership				
0	1	* (20.3, 18.0)	n.s.	n.s.
0	2	n.s.	n.s.	n.s.
0	3	* (20.3, 24.0)	* (19.1, 22.9)	* (18.7, 22.9)
1	2	n.s.	n.s.	n.s.
1	3	* (18.0, 24.0)	* (17.3, 22.9)	* (18.0, 22.9)
2	3	* (18.9, 24.0)	* (18.4, 22.9)	* (18.6, 22.9)

* = p<.10; n.s. = p>.10

Discussion:

Inter-group differences: Doctors gave higher ratings scores to the other groups on the IPC scale than they received from the other groups. Both other groups rated doctors lowest of their other 2 target groups.

Doctors always have the lowest scores on the attitude-type items. They are not as willing as others to endorse team working aspects. Scores for the Shared Leadership subscale were lower than the Team Efficiency subscale.

No consistent predictors of change over time emerged in this study. Some limited change was observed; most of the variation was *between* persons instead of over time. The possibility of change was most evident on the Shared Leadership scale, where the correlations between initial scores and change were moderate or large.

Differences in attitudes scores between leadership capacity levels tend not to persist over time, except on Shared Leadership. Indicates where there is temporal stability (Shared Leadership) and where there is fluidity (Team Value, Team Efficiency).

Most of the significant differences involve high-leadership capacity participants, e.g., more senior, managerial people have higher average scores. Means comparisons suggest the leadership capacity construct reveals 2 or 3 groups: i) high on leadership capacity/experience ii) low on conventional leadership criteria (junior; relatively inexperienced, non-managers) who resemble the high leadership group on attitudes scores; and iii) an intermediate group.

This study does not support strong inferences about the causal role of simulation training in motivating change. These are correlational data; thus the usual caution about correlation and cause/effect.

Take Away Messages:

- Most scales demonstrated acceptable reliability.
- Modest support for Shared Leadership – lowest among doctors.
- Simulation may be a means of educating clinicians about IPC – more research needed.
- Leadership capacity in most senior and junior clinicians a potential source of change in IPC.

Study Limitations:

- Compressed time frame (6 weeks) may not have provided sufficient time to measure change.
- Unbalanced representation in sub-groups (large number of nurses; fewer other professionals; even fewer MDs).
- Lack of control group and selection bias in participants (self-selection).
- Scalar equivalence within instruments is unknown & may not be present.

References

Adams, A., Bond, S., & Arber, S. (1995). Development and validation of scales to measure organisational features of acute hospital wards. *International Journal of Nursing Studies, 32*, 612-627.
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