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Author(s)	O'Connor, Paul; O'Dea, Angela; Lydon, Sinéad; Offiah, Gozie; Scott, Jennifer; Flannery, Antoinette; Lang, Bronagh; Hoban, Anthony; Armstrong, Catherine; Byrne, Dara
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A Mixed-Methods Study of the Causes and Impact of Poor Teamwork between Junior Doctors and Nurses

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Objectives. This study aimed to collect and analyse examples of poor teamwork between junior doctors and nurses; identify the teamwork failures contributing to poor team function; and ascertain if particular teamwork failures are associated with higher levels of risk to patients. **Design.** Critical Incident Technique interviews were carried out with junior doctors and nurses. **Setting.** Two teaching hospitals in the Republic of Ireland. **Participants.** Junior doctors ($n=28$), and nurses ($n=8$) provided descriptions of scenarios of poor teamwork. The interviews were coded against a theoretical framework of healthcare team function by three psychologists, and were also rated for risk to patients by four doctors and three nurses.

Results. A total of 33 of the scenarios met the inclusion criteria for analysis. A total of 63.6% (21/33) of the scenarios were attributed to 'poor quality of collaboration', 42.4% (14/33) to 'poor leadership', and 48.5% (16/33) to a 'lack of coordination'. A total of 16 scenarios were classified as high-risk and 17 scenarios were classified as medium-risk. Significantly more of the high-risk scenarios were associated with a 'lack of a shared mental model' (62.5%, 10/16) and 'poor communication' (50.0%, 8/16) than the medium-risk scenarios (17.6%, 3/17 and 11.8%, 2/17 respectively). **Conclusion.** Poor teamwork between junior doctors and nurses is common and places patients at considerable risk. Addressing this problem requires a well-designed complex intervention to develop the team skills of doctors and nurses and foster a clinical environment in which teamwork is supported.

INTRODUCTION

Effective teamwork between healthcare professionals is recognised to be a critical element of patient safety and quality of care [1]. Research has consistently demonstrated that the nature of the collaboration between doctors and nurses is related to patient outcomes such as the duration of patient stay [2], patient mortality [3], and the occurrence of medication errors [4].

Effective team functioning in the healthcare environment is well understood. An effective healthcare team shares common aims and objectives, has clearly defined goals, has a functional team leader, communicates efficiently and effectively, is cohesive, and comprises team members who are respectful of one another [5]. A review of the literature suggests that the key elements of effective doctor-nurse teamwork are: the quality of the collaboration, coordination, shared mental models, communication and leadership [6]. These elements of teamwork are discussed briefly below.

Collaboration can be defined as respect and goodwill between team members, and *coordination* requires team members to work together in order to effectively manage a situation [6]. Collaboration and respect have been found to be predictors of patient safety climate [7]. However, there is evidence to suggest that interprofessional collaboration is less valued by doctors than by nurses [8]. Collaboration and coordination are also clearly challenged in environments in which bullying and undermining behaviours are common. An endemic culture of bullying and undermining behaviour in the clinical learning environment has been recognised both in Ireland [9], and in other countries [10]. In a 2015 survey of Irish interns, 29% reported that they had ‘frequently’ experienced bullying and undermining behaviour [9]. In a 2014 survey of nurses in Ireland, 51.9% reported that they had

experienced bullying- an increase of 13.4% as compared to the results from a similar survey in 2010 [11].

Shared mental models provide team members with a common understanding. These models allow the team members to form accurate explanations and expectations about the task and to co-ordinate their actions and behaviours [12]. Shared mental models are crucial for effective patient care [13], and are supported by clear and effective communication. *Communication* can be defined as the exchange of information, feedback or response, about ideas and feelings [12].

Leadership can be defined as the effective and dynamic management of the healthcare team to ensure optimal outcomes [6]. It is unsurprising that leadership behaviours support effective teamwork. However, the use of effective leadership behaviours can be a particular challenge in environments in which team members do not have positional authority to take a leadership role (e.g. junior doctors and nurses working together in ad-hoc teams).

Although there is a substantial body of evidence demonstrating that poor teamwork between doctors and nurses is commonplace [7, 9, 11], there is considerably less research on the interface between very junior doctors and nurses. However, of all the interprofessional relationships in the hospital, this relationship is particularly important. The reason for this importance is that the first doctor to be called by a nurse to evaluate a sick patient is often the most junior. Effective teamwork between junior doctors and nurses is particularly critical to the care of acutely unwell patients to ensure that they are identified and effectively treated. Yet, there is evidence that these newly qualified doctors are ill-prepared to perform their duties [14, 15]. Junior doctors often struggle with knowledge transfer, dealing with

uncertainty, understanding their role and operating within medical team hierarchies [14, 16-20].

The objectives of the research reported in this paper were to: (i) collect and analyse examples of poor teamwork between nurses and interns (the first year of postgraduate training for a doctor in Ireland); (ii) identify the failures in teamwork that contributed to poor teamwork; and (iii) ascertain if specific types of teamwork failures are associated with higher levels of risk to patients. The purpose of the paper was to provide the information necessary to support the development of evidence-based interventions designed to improve teamwork between junior doctors and nurses

METHOD

Setting and Ethical Approval

Participants were recruited from two large teaching hospitals in the Republic of Ireland.

Ethical approval was obtained from the participating hospitals.

Participants

The participants were 28 interns (male, $n=12$; and female, $n=16$) in their first year of clinical practice. The interns had a mean of 0.49 years of experience (st dev= 0.03). Eight qualified nurses (all female) also participated. The nurses had a mean of 8.9 years of experience (st dev= 3.36). A total of 20 of the interns, and all of the nurses were from one hospital, and eight interns from the other participating hospital. All of the participants worked on either a surgical or medical ward.

Interview procedure

Critical Incident Technique (CIT) interviews were carried out in November and December 2012 and November and December 2013. CIT interviews enable the researcher to understand the knowledge, skills and attitudes of the respondents by asking them to describe a challenging incident. The CIT interview process involves several stages: (1) selecting an appropriate incident; (2) developing a detailed description of the specific events, using probing questions to understand the reasoning; (3) exploring cues and rationales for the actions taken by members of the team; and (4) identifying the root causes of the incident [21]. In our study, participants were asked to describe an event, in which they had been involved, where nurses and interns had failed to work effectively as a team. They were asked to select an event that had occurred within the previous six months. Probing questions focused on the teamwork aspects of the event. The interviews were recorded using a digital audio recorder.

Sampling was carried out using judgment and snowball methodologies. The interviewing continued until new categories, themes or explanations stopped emerging from the data and the research team determined that data saturation had been reached. This required an iterative approach to sampling, data collection, analysis and interpretation.

Three interns and one nurse were trained to conduct CIT interviews by a psychologist (POC) practiced in using this methodology. Experience of carrying out CIT interviews in other domains suggests that social desirability bias can be reduced if interviews are conducted ‘within-group’ [21]. Thus, interns interviewed interns, and nurses interviewed nurses.

Content analysis

Three psychologists (POC, AOD, SL) with backgrounds in occupational health psychology carried out the analysis. Of the 36 scenarios collected (28 from interns and eight from nurses), three scenarios were discarded because they were not concerned with poor teamwork between interns and nurses. The unit of analysis was each of the 33 remaining scenarios.

A deductive content analysis approach was taken to organising and analysing the data [22]. Manser's framework for effective team function [6] was used to code the teamwork failures contained within the scenarios. For the purposes of our research, the psychologists developed categories and definitions of each aspect of poor teamwork. These were:

- 'poor quality of collaboration'- failure to work with other team members in a trusting and respectful manner;
- 'lack of coordination'- failure to work effectively as a team and coordinate to prioritise a patient's needs and/or tasks;
- 'lack of shared mental models'- team members do not have a common understanding about required task and/or patient care;
- 'poor communication'- lack of clear and open communication between team members; and
- 'poor leadership'- lack of explicit leadership resulting in a failure to demonstrate or uphold appropriate standards of patient-focused clinical care.

In order to ensure that the categories were sufficiently internally homogenous and externally heterogeneous, the definitions were illustrated with exemplar behaviours derived from the interview data (see Table 1).

The three psychologists then used the framework to code the failures in teamwork contained within the scenarios. These codes represented the contributory factors that lead to poor team function within the 33 scenarios. Each of the scenarios was discussed among the researchers, and consensus reached about which contributing factors were applicable. In addition, quotes were selected based upon whether they were representative of the research findings. The selection of the quotes was carried out by consensus between the researchers.

Risk ratings

Seven SMEs rated the risk to patients associated with each scenario. The SMEs were four doctors with a mean of 14.0 years of experience (st dev= 5.7); and three nurses with a mean of 12.7 years of experience (st dev= 5.0). All of the SMEs were involved in intern training.

The scenarios were presented to the SMEs in a random order using on-line survey software. The Irish Health Services Executive's (HSE) risk assessment tool [23] was used to generate the risk rating. For each scenario, the SMEs were asked to rate the potential impact of the event on patient safety from 'negligible' (1) to 'extreme' (5). The SMEs were also asked to rate the likelihood of other interns/nurses encountering a similar situation from 'rare/remote' (1) to 'almost certain' (5). The 'impact' and 'likelihood of occurrence' ratings from each SME for each scenario were then multiplied together to give an overall risk score. A mean risk score based upon the ratings of the seven SMEs was then calculated for each scenario. A risk rating of five or less was considered 'low-risk', between 5 and 12 'medium-risk', and greater than 12 'high-risk' [23]. The risk ratings and the content analysis were carried out independently.

RESULTS

Content analysis

'Poor quality of collaboration' was the most commonly identified cause of poor teamwork within the scenarios. A total of 21 out of 33 scenarios involved this teamwork failure (see Tables 1 and 2). Although the nurses appeared to work well together, there was evidence of nurses 'ganging up' on the intern (see example 1 from Table 1). The interns reported feeling compelled to perform a task in order to *'keep the nurses happy'* rather than because they felt the task was clinically necessary for the patient.

Table 1. Definitions, exemplar behaviours and interview quotes for each teamwork factor.

Aspect of teamwork	Definition	Exemplar behaviours	Examples from interviews
Poor quality of collaboration	Fails to work with other team members in a trusting and respectful manner.	<ul style="list-style-type: none"> • Lack of mutual trust and respect between team members • Undermining/bullying a team member • Failure to address conflict between team members • Respond aggressively to a team member 	<ol style="list-style-type: none"> 1. “I [the intern] knew that the nursing staff had been bitchy about me before I arrived; they made no effort to hide it.”(interview 26) 2. “Her [the nurse] response was- that’s why this hospital is the way it is, interns can’t see what is under their nose’ (interview 27) 3. “I [the nurse] felt the intern didn’t value my experience... I felt insulted that the intern didn’t trust me.” (interview 29)
Poor leadership	Fails to lead the team, or demonstrate appropriate standards of clinical care.	<ul style="list-style-type: none"> • Failure to follow accepted protocols • Failure to act in the best interest of the patient • Failure to advocate for the patient 	<ol style="list-style-type: none"> 4. “When the intern arrived on the ward I [the nurse] was on my tea break.... the intern said if I didn’t come out then he would leave without prescribing the insulin.” (interview 31) 5. “The patient was on the ground... I [the intern] asked a nearby nurse to help me get the patient on the bed. The response from the nurse was- I’m not covering this patient”. (interview 14)
Lack of coordination	Fails to work effectively as a team and coordinate to prioritise a patient’s needs and/or tasks.	<ul style="list-style-type: none"> • Lack of appreciation of the workload of other team members • Team member performs a task beyond their capability • Failure to work effectively as a team • Lack of willingness to help a struggling team member 	<ol style="list-style-type: none"> 6. “Again, I [the intern] found myself alone dealing with this acute medical emergency.” (interview 14) 7. “The nursing staff refused to get an ECG from another ward so I [the intern] had to leave the unstable patient and go get an ECG.” (interview 19) 8. “I overheard the nurse calling the Registrar before I [the intern] had a chance to examine the patient myself and come up with a management plan.” (interview 1)
Lack of shared mental models	Team members do not have a common understanding about required task and/or patient care.	<ul style="list-style-type: none"> • Team members do not have a shared knowledge of a situation • Lack of a shared understanding between team members • Lack of agreement on the tasks to be carried out, and/or by whom. 	<ol style="list-style-type: none"> 9. “I [the intern] had prescribed one litre normal saline at 40 mmol/hr with no electrolytes added. I later noticed a bag of fluids with 40 mmol of potassium in it had been hung.” (interview 18) 10. “The nursing staff were only getting around to giving the patient the fluids now, although they had been prescribed about 4 or 5 hours earlier.” (interview 24) 11. “I [the intern] came back to check on the patient, as I hadn’t been called. He was swollen and was becoming dyspnoeic.” (interview 26)
Poor communication	Lack of clear and open communication between team members.	<ul style="list-style-type: none"> • Failure of two-way communication 	<ol style="list-style-type: none"> 12. “The nurse informed me [the intern] that they had phoned the ward and were looking to speak to the doctor requesting the blood. This was the first I had heard of it.” (interview 9) 13. “The nurse who had bleeped me [the intern] had failed to inform me that the patient was having active large hematemesis.” (interview 14) 14. “The nursing staff had adjusted the time of administration without communicating this to the medical team.” (interview 16)

Table 2. Frequency and Fisher’s exact test comparison of aspects of poor teamwork based upon level of risk.

Aspect of poor teamwork	All (n=33)	Medium-risk (n=17)	High- risk (n=16)	p-value
Poor quality of collaboration	21 (63.6%)	13 (76.5%)	8 (50.0%)	<i>0.16</i>
Poor leadership	14 (42.4%)	10 (58.8%)	4 (25.0%)	<i>0.08</i>
Lack of coordination	16 (48.5%)	9 (52.9%)	7 (43.8%)	<i>0.73</i>
Lack of shared mental models	13 (39.4%)	3 (17.6%)	10 (62.5%)	<i>0.01</i>
Poor communication	10 (30.3%)	2 (11.8%)	8 (50.0%)	<i>0.03</i>

There were also a number of examples of aggressive and/or undermining behaviours between interns and nurses (see examples 2 and 3 in Table 1). Nurses complained that interns did not value their experience. The interns also showed a lack of respect for nurses’ opinions and/or clinical judgment (see example 3 in Table 1). Interns reported feeling pressure from many competing demands, but the challenges of dealing with these demands were unrecognised by the nurses.

‘*Poor leadership*’ was identified as a contributing factor in 14 of the 33 scenarios (see Table 2). Poor leadership was synonymous with a lack of patient-focused care. In these instances the team failed to act in the best interest of the patient or to maintain appropriate standards of patient care (see examples 4 and 5 in Table 1). The reason for this lack of patient focus was generally because the interns and nurses were distracted from caring for the patient as a result of their frustrations with each other. As a result, there were sometimes delays in patient care, and on occasion a nurse or intern refused to carry out a task for a patient in order to ‘punish’ the intern or nurse with which they had a disagreement.

There was no evidence of interns or nurses taking a leadership role in any of the scenarios, resulting in a 'lack of leadership' as a recurrent theme. They would 'ask' each other to carry out tasks, but there was little evidence of either group assuming a leadership role in situations of uncertainty.

Just over half of the scenarios were attributed to a '*lack of coordination*' (see Table 2).

Common themes in these scenarios were: interns carrying out tasks they did not feel competent to perform (see Table 1, example 6), nurses not helping the intern (see Table 1, example 7), and interns who were unable to respond in a timely manner to calls to review patients as they were occupied with other patients (see Table 1, example 8). The most common reasons for the lack of coordination were attributable to nurses, and more senior doctors, being too busy carrying out other tasks to be able to help the interns.

Additionally, nurses and interns differed in their willingness to recourse to senior members to resolve a lack of coordination and obtain support and advice (See example 8 in Table 1).

There were 10 instances of the nurse disagreeing with how an intern behaved or was treating a patient. In ninety percent (90%) of these occasions the nurse contacted a more senior member in order to address the disagreement. There were 12 instances in which the intern disagreed with how a nurse behaved or was treating a patient. On three (25%) of these occasions the intern contacted a more senior member to resolve the difficulty. The difference between nurses and interns in terms of their willingness to involve a senior team member is statistically significant (OR =27.0, 95% CI (2.34-311.2), $p < 0.001$).

'*Lack of shared mental models*' was identified as a causal factor in approximately a third of the scenarios (see Table 2). The 'lack of a shared mental models' was used to categorise

those scenarios in which the interns’ understanding of the situation and the actions necessary, differed from the nurses’ understanding of the situation (see examples 9 to 11 in Table 1). The most common scenario was where an intern or nurse believed a particular treatment or medication had been given when, in fact, it either had not been given at all or a different treatment or medication has been administered.

For the nine scenarios in which ‘*poor communication*’ was identified as a causal factor, the overarching issue involved a failure to share pertinent information about patient care between nurses and interns (see Table 1, examples 12 to 14). This included failures to share information about a patient’s condition, whether a particular treatment had been started (or discontinued), and the passing on of requests from others.

Risk ratings

The seven SMEs read each of the scenarios and rated the potential impact on safety and likelihood of occurrence. The resulting data are shown in Table 3.

Table 3. Distribution of SME impact on safety and likelihood of occurrence ratings for the 33 scenarios.

Impact	Percentage (proportion of ratings)	Likelihood	Percentage (proportion of ratings)
Negligible	2.2% (5/231*)	Rare/remote	1.7% (4/231)
Minor	19.9% (46/231)	Unlikely	8.2% (19/231)
Moderate	29.0% (67/231)	Possible	40.7% (94/231)
Major	36.8% (85/231)	Likely	36.4% (84/231)
Extreme	12.1% (28/231)	Almost certain	13.0% (30/231)

*The denominator is derived from the 7 SME ratings for each of the 33 scenarios.

None of the scenarios emerged as low-risk, 17 scenarios emerged as medium-risk, and 16 scenarios emerged as high-risk (see Table 2). The inter-rater reliability of the risk rating was a Fleiss' kappa of 0.66 (substantial agreement).

High- and medium- risk scenarios were compared to ascertain if there were differences in the contributory teamwork failures. It emerged that a significantly larger proportion of high-risk scenarios were attributed to 'lack of shared mental models' and 'lack of communication' than the medium risk scenarios (see Table 2). There were no significant differences between the high and medium risk scenarios in terms of attributions of 'poor quality of collaboration', 'poor leadership', or 'lack of coordination' (see Table 2).

DISCUSSION

In the Irish healthcare system, the first doctor to be called by a nurse to manage an acutely unwell patient is typically the most junior doctor on the team. As such, effective teamwork between these healthcare professionals is crucial for patient safety and quality of care. The research reported in this paper identified poor quality of collaboration, poor leadership and lack of coordination as the most common causes of poor teamwork between nurses and interns. Moreover, up to half of the incidents were considered to have high impact on patient safety and to frequently occur within the healthcare system.

Collaboration and mutual respect are critical to effective patient care [7]. However, poor quality of collaboration was the most common failure of teamwork identified in the scenarios. Our study showed that conflict and bullying is also a feature of the nurse/intern relationship, and that these behaviours interfere with patient-focused care. Interns and nurses have

different, and sometimes competing, goals that can compromise team coordination [19, 20]. Although the nurses on a particular ward work as a team, the intern tends to work more autonomously in a role that is poorly defined, and with limited support from more senior doctors [16, 19, 20]. As such, the interns in this study often felt isolated and unsupported. The interns' isolation was compounded by the fact that, unlike nurses, interns seem reluctant to involve more senior doctors in settling any disagreements. This is consistent with research that has found that junior doctors are unwilling to seek guidance and clinical support from seniors, or inform them when they are struggling [24].

Lack of shared mental models and poor communication between interns and nurses were associated with high levels of potential risk to patients. In fact, both hospitals in which our research was carried out have introduced a physiological track and trigger system (PTTS) to support both communication and the sharing of mental models between healthcare professionals, this procedural approach does not appear to have been as effective as desired. A PTTS is used to identify patients at-risk for worsening outcomes (track) and ensure that these patients receive appropriate care (trigger). The system includes a procedural communication tool for healthcare professionals (called ISBAR) [25]. However, research on the attitudes of staff at these two hospitals to the PTTS found that interns cited the PTTS as a source of conflict between doctors and nurses. Interns reported that the system created an expectation by nurses that the intern would respond immediately to each call that was received, and that it allowed the nurse to offload responsibility for the patient onto the intern. Both nurses and interns indicated that there was also a need to reinforce the use of ISBAR [26].

Poor quality of collaboration, lack of leadership, lack of coordination, lack of shared mental models and poor communication have been identified as detrimental to effective team performance in healthcare [14, 16, 19, 20]. Our study adds context to this evidence with regard to the nurse/intern relationship and expands upon previous research by using SMEs to generate risk ratings in order to identify the teamwork failures that have the greatest potential to result in patient harm. Using this methodology it emerged that almost one half of the scenarios were considered to pose 'high' levels of risk to patients. Moreover high-risk situations are more likely to be caused by poor situation awareness between team members and lack of communication. This evidence provides support for the development of targeted interventions to tackle the teamwork failures that pose the greatest risk to patients. Our research identifies a 'lack of shared mental models' and 'lack of communication' as teamwork problems which pose the greatest risk to patient safety. Thus, effective interventions designed to improve teamwork performance in these areas must be developed and evaluated.

Recommendations to improve teamwork

Taking a sociotechnical systems approach to poor teamwork between intern and nurses, it is possible to recommend a number of interventions.

- At a societal, cultural, and regulatory level, increasing the resourcing of hospitals and employing a greater number of interns and nurses will reduce workload, and possibly levels of undermining and bullying behaviour [27].
- At an organisational level, legislation, collective agreements, and other regulatory agreements could be used to address the endemic culture of undermining and bullying behaviour [28]. Hospital-wide quality management systems have also been found to be associated with positive teamwork climate [29].

- At a team level, increasing the level of support for interns by senior doctors and carrying out multidisciplinary team training, such as crew resource management, has been shown to improve teamwork and may improve the quality of junior doctor-nurse collaboration [30, 31].
- At an individual level, interprofessional shadowing (e.g. medical students spend time shadowing nurses [32]) has been shown to improve the understanding of the role and the responsibilities of each member of the team which may improve junior doctor-nurse relations.
- At the work environment level there is a need for a better definition of the roles and responsibilities of a junior doctor, [14, 16-19] and more rigorous use of any existing PTTs, and ISBAR.
- At the patient level, simulation can provide a safe learning environment in which interns and nurses can learn to work as an effective team, to care for complex simulated patients [33].

A consistent finding in articles on quality improvement in healthcare is that change is difficult to achieve [34]. Common reasons why interventions fail to have a long term impact include a failure to: develop the interventions systematically; use best available evidence and appropriate theory; and understand the environment in which the intervention is to be applied [35]. Therefore, there is a need for a measured approach that incorporates behavioural change and implementation science. It is suggested that the UK Medical Research Council Complex Intervention Framework [36] be used to design appropriate interventions and planning policies that support the desired changes in behaviour [34]. Such an intervention will require collaboration between medical and nursing schools, as well as hospital-based senior doctors and nurses in order to produce a sustained change in teamwork between interns and nurses.

Limitations

In common with other qualitative research approaches, the CIT could be criticised due to subjectivity in the reporting or the analysis of the data, In order to mitigate these issues, a rigorous approach was taken to both the collection and analysis of the data. In addition CIT could be criticised for lack of generalisability. Since the CIT is based on the analysis of incidents of poor teamwork it may not be representative of typical levels of collaboration between nurses and interns. There is certainly some possibility of this, but the ratings of the SME would suggest that at least half of the scenarios were a 'likely' or 'almost certain' occurrence. Other limitations were that nurses may have been underrepresented in the sample, resulting from the use of convenience and snowball sampling. Nevertheless, the findings from the study are in broad agreement with similar studies carried out in other countries [16, 19].

Qualitative, as opposed to quantitative principles were used determine the number of interviews that were necessary. Therefore, there is a possibility of type II error in the analysis of differences between the high and medium risk scenarios. Future studies may use the data provided here as a basis for sample size calculations, such data was not available for this study.

CONCLUSION

Poor teamwork between nurses and junior doctors is not a new phenomenon. However, effective teamwork between junior doctors and nurses is crucial to patient safety and quality of care. Changes in both the delivery of healthcare and the clinical working environment

mean that interprofessional teamwork has, and will continue to, become increasingly important to the delivery of safe and effective patient care. There is not a simple solution to improving teamwork. It requires a complex intervention that focuses on the development of the team skills of doctor and nurses, and fostering a clinical environment in which teamwork is supported.

CONFLICT OF INTEREST

The authors declare that they have no conflicting interests.

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