Midwifery 31 (2015) 90–94

Contents lists available at ScienceDirect

Midwifery

journal homepage: www.elsevier.com/midw

Relationship between reflection ability and clinical performance: A cross-sectional and retrospective-longitudinal correlational cohort study in midwifery

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ARTICLE INFO

Article history:
Received 19 January 2014
Received in revised form
29 April 2014
Accepted 19 June 2014

Keywords:
Midwife
Reflection
Performance
Professional competence
Clinical workplace

ABSTRACT

Background: increasingly, reflection is highlighted as integral to core practice competencies but empirical research into the relationship between reflection and performance in the clinical workplace is scarce.
Aim: this study investigated the relationship between reflection ability and clinical performance.
Methods: we designed a cross-sectional and a retrospective-longitudinal cohort study. Data from first, second and third year midwifery students were collected to study the variables 'clinical performance' and 'reflection ability'. Data were analysed with SPSS for Windows, Release 20.0. Descriptive statistics, Pearson's Product Moment Correlation Coefficients (r) and r^2 values were computed to investigate associations between the research variables.
Findings: the results showed a moderate observed correlation between reflection ability and clinical performance scores. When adopting a cross-sectional perspective, all correlation values were significant ($p < 0.01$) and above 0.4, with the exception of the third year correlations. Assuming perfect reliability in the measurement, the adjusted correlations, for year 2 and year 3 indicated a high association between reflection ability and clinical performance (> 0.6). The results based on the retrospective-longitudinal data set explained a moderate proportion of the variance after correction for attenuation. Finally, the results indicate that 'reflection ability' scores of earlier years are significant related with 'clinical performance' scores of subsequent years. These results suggest that (1) reflection ability is linked to clinical performance; (2) that written reflections are an important, but not the sole way to assess professional competence and that (3) reflection is a contributor to clinical performance improvement.
Conclusions: the data showed a moderate but significant relationship between 'reflection ability' and 'clinical performance' scores in clinical practice of midwifery students. Reflection therefore seems an important component of professional competence.

Introduction

The midwifery professional (i.e. the fully qualified midwife) is an individual who has met the International Confederation of Midwives (ICM) Definition of a Midwife (International Confederation of Midwives, 2011) and who has been educated and who has demonstrated competency in performance of the ICM Essential Competencies for Basic Midwifery Practice (International Confederation of Midwives, 2013). Reflection is increasingly highlighted as an integral part of professional competence (Wald and Reis, 2010; Fullerton et al., 2011). It is generally assumed that reflective practice, that is, the willingness of students to think critically and to engage themselves in reflection upon their professional activities, contributes to the performance improvement (Epstein, 1999; Maudsley and Strivens, 2000; Guest et al., 2001; Mamede and Schmidt, 2004). The notion of reflection as a contributor to performance improvement has its roots in the work of John Dewey. Dewey's philosophy (1938) proposes a

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http://dx.doi.org/10.1016/j.midw.2014.06.006
0266-6138/

theory that puts personal experiences at the centre of education. Sound educational experiences guarantee continuity and interaction between the learner and what is learned. The challenge for experience-based education is to provide learners with quality experiences that result in growth. A key element of experience-based learning is that learners are invited to analyse their experiences by reflecting, evaluating and reconstructing them. Building on earlier experiences, this analysis helps drawing meaning from new experiences. These explicit deliberations upon experiences may lead to further action (Kolb, 1984; Boud et al., 2000). Interest in the theme of reflection with the goal of improving clinical performance has seen an exponential growth. However, hardly any empirical research has been conducted into the relationship between reflection and performance (Wald and Reis, 2010; Mann, 2011; Lew and Schmidt, 2011).

The relationship between reflection and performance is part of the definition of professional competence: 'the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and the community being served' (Epstein and Hundert, 2002). Within this definition, reflection is identified as a core skill for professional development (Friedman Ben David et al., 2001; Wald and Reis, 2010). Reflection is intended to deepen understanding and to explore the broader context of experience (Sandars, 2009; Mann, 2011). Although a recent study by Lew and Schmidt (2011) found that the self-reflection resulted in limited improvement in academic performance, there is evidence that reflection can help learners in understanding and assimilating new concepts, contextualising learning and enabling performance improvement (Moon, 1999; Boud and Walker, 2002; Grant et al., 2006; Mann et al., 2009; Mann, 2011; Azer et al., 2013).

As reflection does not develop automatically, health care educators look for educational strategies promoting the development of the reflective capacity as early as possible in the training process. In this context, reflective writing has been described as an effective mechanism promoting self-reflection within medical education (Charon, 2006; Moulton et al., 2007; Wald and Reis, 2010). However, research about reflective writing in medical education has remained largely anecdotal or was based on student self-reporting (Wald et al., 2012). A review concluded that reflection research is still at an early stage and that exploratory research approaches are appropriate to develop deeper understanding of reflective learning and how this is related to performance improvement (Mann et al., 2009).

The purpose of the present study was to investigate the relationship between reflection ability and clinical performance. The research question, then, was: Is there a relationship between reflection ability and clinical performance? We used clinical performance scores as the best proxy of professional competence. This is in line with While (1994) who makes an important distinction between the concepts of 'competence' and 'performance' in midwifery and nursing. She concluded that as competence is concerned with perceived skills, it cannot be directly measured, whereas performance as actual situated behaviour is open to measurement and reflects what midwives and nurses actually do in clinical practice (Fleming et al., 2011). We analysed clinical performance data both cross-sectionally and longitudinally to study the relationship with reflective ability.

Method

Context

The Midwifery department of the University College Artevelde-hogeschool Ghent (Belgium) offers a three-year undergraduate competency-based programme (corresponding 180 credit points). According to the European Directives, clinical placement is an essential phase of the midwifery programme during which students develop their competencies in authentic clinical environments. Students attend clinical placements in each of the three years of the programme (corresponding 70 credits) and in different settings (Table 1). Clinical placement is based on an integrated reflective learning and assessment strategy (Embo et al., 2010). In order to promote reflective learning, students are instructed to reflect on their competency development at the end of each clinical placement. These written reflection assignments are scored from 1 to 20 by a clinical teacher according to preset assessment criteria. Clinical teachers are practitioners that observe learners in the workplace setting and take a responsibility in their assessment. The criteria assess the effectiveness of the reflection cycle on clinical performances and on competency development. An important criterion is whether the students' reflections are authentic. Therefore, the clinical teacher and the clinical supervisors who observed the student assess these reflections. These scores are used in this study as the 'reflection ability' data set. Assessment of clinical performances is based on a competency-based rating scale. Each competency consists of a set of context-specific assessment criteria. In the rating scale, different levels in competency mastery are expected for year 1, year 2 and year 3. The clinical supervisor and the clinical teacher for each clinical placement assess the student's performance with the help of the rating scale. The school assessment committee aggregates pass/fail judgments on individual competency level into a final judgment on midwifery competence (score from 1 to 20). These scores are used in this study as the 'clinical performance' data set. The school assessment committee consists of all clinical teachers involved in the programme. Learners are informed about the score assigned by the school assessment committee and there is an opportunity to ask for feedback from clinical teachers. In this way, they can be seen as learning aids, providing feedback and guidance for further workplace learning.

Data collection

Data from first, second and third year students were collected to study the variables 'clinical performance' and 'reflection ability'. We designed a cross-sectional and a retrospective-longitudinal cohort study to answer the research question. This combined design was important due to the high dropout rate in the first year. In Belgium, with the exception of medicine and dentistry, no entry requirements are set other than the diploma of secondary education to start most higher education programmes. Consequently between 25% and 45% of starting students leave during the first year of the programme. In the cross-sectional design, all the students who did a clinical placement in the first year, were included, even those who later left the programme. This is different from the retrospective longitudinal design in which only data are included of graduates that completed the three consecutive years.

Thus, data were collected in two ways: (1) the cross-sectional data were collected in September 2013 from all first ($n=69$), second ($n=50$) and third ($n=50$) year students who completed their clinical placements in the academic year 2012–2013; (2) the retrospective longitudinal data were collected from a sample of 95 students who graduated in September 2012 ($n=43$) and September 2013 ($n=52$) and incorporated also the data of their involvement in the study programme in the earlier two years (starting in September 2009).

Data analysis

Data were analysed with SPSS for Windows, Release 20.0. Descriptive statistics, Pearson's Product Moment Correlation Coefficients (r)

Table 1
Clinical placements.

Undergraduate year	Clinical placements (= setting)	European Credit Transfer System (ECTS = credits)*	Weeks	Effective working hours on the ward
1	Maternity ward	10	6	226
2	Maternity ward	5	3	113
	Delivery ward	10	6	226
	Gynaecology ward	5	3	113
	Neonatal low care	5	3	113
3	Maternity ward	5	3	113
	Delivery ward	15	9	339
	Perinatal care in the first echelon	5	3	113
	Neonatal high care	5	3	113
	Minor: choice	5	3	113
TOTAL		**70 ECTS**	**42 weeks**	**1582 hours**

The undergraduate midwifery bachelor programme consists of 180 ECTS (= 60 ECTS for each undergraduate year)*

and r^2 values were computed to investigate associations between the research variables: 'clinical performance' scores and 'reflection ability' scores. A significance level of $p < 0.05$ was used, and r values of 0–0.2 were generally considered weak, 0.3–0.6 moderate, and 0.7–1 strong (Brace et al., 2012). Reliability coefficients were estimated (Cronbach's alpha) based on the repeated assessment across clinical placements. On the basis of the observed correlations and reliabilities, true correlations were estimated by correcting for attenuation (Norman et al., 1996).

Ethical considerations

The Ethical Review Board from the Dutch Association of Medical Education approved this study (NERB dossier number 272).

Findings

This section starts with an overview of the descriptive results. Table 2 represents summary statistics for 'clinical performance' and 'reflection ability' scores for both the cross-sectional and the retrospective-longitudinal data.

Table 3 outlines the correlation analysis scores (r) when studying the association between midwifery student 'clinical performance' and their 'reflection ability' scores. The value of r indicates the strength of the correlation. Next to the strength of the correlation also the significance value should be considered (Brace et al., 2012). Looking at the observed correlation scores, we find positive correlations between 'clinical performance' and 'reflection ability' scores for all study years and in both data sets. All correlations are significant at the 0.01 level (one tailed), except the third year correlation in the cross-sectional data set. The lower correlation score for third year students was not found in the retrospective-longitudinal data set. The observed correlation scores indicate that there is a moderate association between 'clinical performance' and 'reflection ability' scores. Correlation scores allow us to estimate the proportion of variation within our data that is explained by the relationship between both variables. The remaining variation might be due to extraneous variables, both situational and participant. The proportion of explained variation is given by r^2. Note that the proportion of variation explained does not have to be large to be important (Brace et al., 2012). From the cross-sectional results, we can conclude that 31% (year 1), 32% (year 2) and 7% (year 3) of the variation in the performance data can be attributed to reflection or vice versa. From the retrospective data set, we conclude that 18% (year 1), 16% (year 2) and 20% (year 3) respectively of the proportion in the variance of performance can be linked to reflection. Looking at the values after correction for attenuation, we found high correlations for second and third year students in both perspectives. The proportion in the variance of 'clinical performance' that can be linked to 'reflection ability' shifted in the retrospective-longitudinal data set from low to moderate values: 47% (year 2) and 56% (year 3).

Table 4 presents the correlations within the retrospective-longitudinal data in order to correct the data for a halo-effect within study years. The table shows how 'reflection ability' scores of earlier years are still significant related with 'clinical performance' scores in subsequent years.

Table 2
Summary statistics for reflection ability and clinical performance scores.

	Students (n)	Minimum score	Maximum score	Mean* score	SD score
Cross-sectional data					
Year 1 Reflection ability	69	7	18	14.60	2.08
Year 1 Clinical performance	69	7	17	12.69	2.18
Year 2 Reflection ability	50	12	18	14.85	1.36
Year 2 Clinical performance	50	8.50	15	12.55	1.56
Year 3 Reflection ability	50	12.20	16.80	15.27	1.06
Year 3 Clinical performance	50	10.80	16.60	14.18	1.20
Retrospective-longitudinal data					
Year 1 Reflection ability	95	5	20	15.15	2.40
Year 1 Clinical performance	95	5	17	12.94	2.17
Year 2 Reflection ability	95	10	18	14.81	1.58
Year 2 Clinical performance	95	10.50	16	13.16	1.16
Year 3 Reflection ability	95	9.40	18	15.10	1.40
Year 3 Clinical performance	95	9.60	16.80	13.96	1.36

SD, standard deviation.
Scores ranged from 1 to 20.

* The mean scores for second- and third-year students reflect the mean of four (year 2) to five (year 3) different clinical placements over the year.

Table 3
Correlations between reflection ability and clinical performance.

	Students	Observed		Reliability		True	
	(n)	r	r^2	Reflection	Performance	r	r^2
Cross-sectional perspective							
Reflection ability year 1–clinical performance year 1	69	0.56†	0.31				
Reflection ability year 2–clinical performance year 2	50	0.55†	0.30	0.13	0.60	1.00	1.00
Reflection ability year 3–clinical performance year 3	50	0.30*	0.09	0.15	0.61	1.00	1.00
Retrospective-longitudinal perspective							
Reflection ability year 1–clinical performance year 1	95	0.42†	0.18				
Reflection ability year 2–clinical performance year 2	95	0.40†	0.16	0.55	0.47	0.69	0.47
Reflection ability year 3–clinical performance year 3	95	0.45†	0.20	0.49	0.72	0.75	0.56

Observed values: r, Pearson's product-moment correlation coefficient; r^2, explained proportion in variance.
True values: r, de-attenuated correlation coefficient; r^2, explained proportion in variance after de-attenuation. Adjusted correlation is not possible for year 1 as students have only undertaken one clinical placement.
Reliability: Cronbach's alpha.

* Correlation is significant at the 0.05 level (one-tailed).
† Correlation is significant at the 0.01 level (one-tailed).

Table 4
Correlations between reflection ability scores and clinical performance scores in consecutive years.

	Students	Observed		Reliability		True	
	(n)	r	r^2	Reflection	Performance	r	r^2
Retrospective-longitudinal data							
Reflection ability year 1–clinical performance year 1	95	0.42*	0.17				
Reflection ability year 1–clinical performance year 2	95	0.27*	0.07				
Reflection ability year 1–clinical performance year 3	95	0.27*	0.07				
Reflection ability year 2–clinical performance year 2	95	0.40*	0.16	0.55	0.47	0.69	0.47
Reflection ability year 2–clinical performance year 3	95	0.25*	0.06	0.55	0.72	0.39	0.15
Reflection ability year 3–clinical performance year 3	95	0.45*	0.20	0.49	0.72	0.75	0.56

* Correlation is significant at the 0.01 level (one-tailed).

Discussion

The goal of the present study was to assess the relationship between clinical performance and reflection ability in clinical practice. We explored the relationship in midwifery students in different study programme years. We used both a cross-sectional and a retrospective-longitudinal design to study the correlations between clinical performance and reflection ability data.

Our findings demonstrated a moderate observed correlation between reflection ability and clinical performance scores, indicating that specific levels of clinical performance are associated with reflection ability. When adopting a cross-sectional perspective, all correlation values were significant ($p < 0.01$) and above 0.4, with the exception of the third year correlations. Assuming perfect reliability in the measurement, the adjusted correlations for year 2 and year 3 indicated a high association between reflection ability and clinical performance (> 0.6). The analysis results, based on the retrospective-longitudinal data set, explained a moderate proportion in variance after correction for attenuation. The differences in r^2-values were larger in the cross-sectional design but these values may be biased owing to the fact that the data also include information from students that failed. The findings from this study suggest that reflection ability is linked to clinical performance in the workplace. These moderate but significant correlation values confirm that reflection is an essential characteristic of professional competence (Epstein and Hundert, 2002; Wald and Reis, 2010). These findings are important because reflection and performance were measured in the clinical learning environment. They confirm results of existing correlation research between reflection ability and performance in other learning environments (Grant et al., 2006; Lew and Schmidt, 2011). The results also reiterate the importance of considering written reflections as an important way to assess professional competence. However, reflection is of course not the sole component of professional competence and reflection should be combined with other measures to assess other aspects of performance in the workplace (van der Vleuten et al., 2010; Takayesu et al., 2012).

Moreover the results of this study indicate that 'reflection ability' scores of earlier years are significant related to 'clinical performance' scores of subsequent years. This finding supports the evidence that reflection improves students' learning (Moon, 1999; Boud and Walker, 2002; Mamede and Schmidt, 2004; Grant et al., 2006; Mann et al., 2009; Lew and Schmidt, 2011; Mann, 2011; Azer et al., 2013). The results suggest that students' abilities to reflect on how and what they have learned during patient care has a measurable effect and leads to improvements in clinical performance. The results also underpin the recommendation in the literature to stimulate students' reflective ability from the early study years (Driessen et al., 2003).

The current study has several limitations. An important limitation is that the same individuals carried out the judgment on reflective ability and on clinical performance, so they are not completely independent of each other. This may have inflated the correlational analysis. We only studied the relationship between reflection ability and clinical performance in the context of one University College programme about midwifery. Given the marked variability in clinical health care education and clinical practice, the findings may not be transferrable to other programmes. A second limitation is the number of participants. According to Brace et al. (2012), to be acceptable for correlation analysis, one should normally have a sample of 100 participants.

Conclusion

In conclusion, looking to the adjusted correlations in a cross-sectional and retrospective-longitudinal cohort study, we found significant correlations between 'reflection ability' and 'clinical performance' scores in clinical practice in all the undergraduate midwifery years. Reflection therefore seems an important component of professional competence. Further studies might focus on the impact of reflection on performance in midwifery students with different levels of reflection ability and clinical performance. Intervention studies could also build on a differentiated perspective of involving students in reflective writing in view of their clinical performance.

Conflict of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Acknowledgements

The authors wish to thank Tracy Embo for editing the final version of this manuscript.

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