J Nepal Health Res Counc 2022 Jan-Mar; 20 (54): 147-53

# Clinical Competency Retention after Mid-Level Practicum Training and It's Associated Factors among Health Workers of Nepal

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## ABSTRACT

**Background:** Mid-level health workers are deployed in a large proportion with the expectation of similar patient outcomes as with physicians. Mid-level practitioners are Health Assistants and Auxiliary Health Workers who provide clinical care at remote locations. National Health Training Center has been providing 60 days in-service Mid-level Practicum training since 2009 AD for the mid-level practitioners with the aim to enhance quality of patient care in Nepal.

**Methods:** An observational study conducted using retrospective data from onsite follow-up assessment of 180 Mid-level Practitioner from 18 districts of Nepal between July 2015 to June 2019. The retention of competency onsite follow-up was calculated as percentage of assessment score at the end of Mid-level Practicum training. Percentage retention of competency and association of retention with factors were analyzed using independent t-test.

**Results:** Majority of participants were male (85.6%), and working in a Health Post (84.4%). Average clinical competency retention in each domain at their work place was 68.79% in knowledge, 73.80% in patient encounter skill, 82.84% in clinical decision-making skill and 87.58% in clinical procedure skill. Higher age groups, longer years of experience and participants from Terai region found to be associated with lower retention of knowledge. A better enabling environment and higher case load retained higher patient encounter skill.

**Conclusions:** The competency retention among Mid-level Practicum trained mid-level health workers was found to be higher. Factors found associated with competency retention were age, geographic region, years of experience, case load and enabling environment.


**Keywords:** Competency retention; knowledge; MLP; skill.

## INTRODUCTION

Many countries of the world are facing critical shortages of health workers particularly in rural areas, which hinder the provision of essential health services[1]. There is a projection of 18 million health workers shortfall to accelerate universal health coverage by 2030, particularly in low- and lower-middle income countries.[1,2] Non physician clinicians working as substitutes or supplements for physicians in defined areas of care after pre-service or in-service training can maintain the quality of care and patient outcomes [3-9] Nepal has a very low physician density, 0.7 physicians per 1000 which is fairly below World Health Organization's recommendation of 2.3 physicians per 1000 population.[10] Competency assessment for mid-level paramedics of Nepal suggests 14% to 31% gap.[11] Nepal government is providing Mid-Level Practicum (MLP) training to fill the observed competency gap.[12] This study aims to explore clinical competency retention at their work place after MLP training.

## METHODS

This was an observational study that used retrospective data. A total of 180 MLP training graduates (MLPs) working at Health Post (HP), Primary Health Center (PHC) and District Hospital of 18 districts of Nepal during the time period July 2015 to June 2019 AD were included. The study area represented all three ecological regions, 7 provinces and east to west part of Nepal. (Fig 1)

Follow up assessment was carried out by MLP trainers who were trained and certified by National Health Training Center (NHTC), health training conduction and certifying apex body of Nepal. The competency score

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at the end of training was extracted from the training record. All MLPs followed up at least after six months of the training were included purposely in the study. Total followed-up MLPs were 201 between the study period but the sample size is 180 after exclusion. Exclusion criteria was set as incomplete or missing data due to various reasons. A structured assessment tool accredited by NHTC was used for the assessment of knowledge and skill during training and follow up assessment. The average competency retention of each domain namely knowledge, patient encounter skill, clinical decision-making skill and clinical procedure skill was calculated as assessment score at follow-up as percent of assessment score at the end of MLP training. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 16. The significance level for data analysis was set at 5%. Percent retention of competency and mean difference of competency retention in different variables were analyzed using independent t-test. We applied multivariate linear regression to determine the controlled effect of each independent variable with competency retention.

The assessment findings were carried out by MLP trainers. Investigators used a third party to extract data and data mining tasks to avoid personal bias. Official permission obtained from the ethical board of Nick Simons Institute (NSI). Ethical approval received from Nepal Health Research Council (Ref. No 1530, 31 December 2019). No individuals disclosed in the study with considering their ethical issues. We used the data available at NSI from training and follow up records. The individuals participated in training with their acceptance of rules of NHTC.

## RESULTS

Gender distribution is male dominant which comprises 86% of all participants. As all the study units were government employees, the age distribution is skewed towards more than 40 years which accounted for 55.56%. The age ranges from 21 years to 58 years. The ethnic distribution is dominated by the Brahmin/Chhetri group which is 58.89%, whereas, Dalits accounted for 4 percent. The study population is largely dominated by Auxiliary Health Workers (AHWs) which comprises 81%. Majority MLPs (more than 84%) were from Health Posts, the smallest health facility in rural and remote places. (Table 1)

The average time span between training and follow-up was more than 2 and half years. Over 81% of total MLPs were retained in the same facility during training and on-site follow-up. The study showed the average year of work experience among retained MLPs was 9.5 years.

The average competency retention at follow-up assessment was found higher on the skill domain than that of the knowledge domain.

Average clinical competency retention in each domain at their work place was 68.79% in knowledge, 73.80% in patient encounter skill, 82.84% in clinical decision-making skill and 87.58% in clinical procedure skill. (Fig 2, Table 2)

Comparison on the average retention between the MLPs of age group below 40 and above 40 years, revealed a significant difference. Age group below 40, had a higher retention of knowledge significantly. More importantly, with skill retention, there was no significant difference among age groups. Likewise with age, higher years of experience found lower retention in knowledge at follow-up assessment. It is assumed that the more client flow allows MLPs more frequent practice and that can help better retention. Findings revealed that MLPs working at health facilities with more than 15 patients per day had patient encounter skill retained significantly higher than less than 15 patients per day. MLPs working in a better enabling environment showed significant retention in knowledge and patient encounter skill but the difference in decision-making skill and clinical procedure skill was not statistically significant. (Table 3)

The result found no significant difference among level of health facility, cadre and gender with the competency retention. The result showed the knowledge retention significantly associated with the geographical region. MLPs of Terai retained less knowledge than that of mountains and hills. All three domains of skill retained similarly with all geographical regions. (Table 4)

**Table 1. Demographic information of participants.**

| Variable | Characteristics | Frequency | Percent |
|---|---|---|---|
| Sex | Male | 154 | 85.6 |
| | Female | 26 | 14.4 |
| **Total (n)** | | **180** | **100** |
| Age in years | 20-30 | 29 | 16.11 |
| | 30-40 | 51 | 28.33 |
| | 40-50 | 75 | 41.67 |
| | 50-59 | 25 | 13.89 |
| **Total (n)** | | **180** | **100** |
| Ethnicity | Dalit | 8 | 4.44 |
| | Janajati | 28 | 15.56 |
| | Madheshi | 38 | 21.11 |
| | Brahmin / Chhettri | 106 | 58.89 |
| **Total (n)** | | **180** | **100** |
| Cadres | HA | 33 | 18.3 |
| | AHW | 147 | 81.7 |
| **Total (n)** | | **180** | **100** |
| Working HF during training | Hospital | 14 | 7.8 |
| | Primary Health Center | 8 | 4.4 |
| | Health Post | 158 | 87.8 |
| **Total (n)** | | **180** | **100** |
| Working HF during Follow-up | Hospital | 20 | 11.1 |
| | Primary Health Center | 8 | 4.4 |
| | Health Post | 152 | 84.4 |
| **Total (n)** | | **180** | **100** |

**Table 2. Knowledge, Patient Encounter Skill, Clinical Decision-Making Skill and Clinical Procedure Skill retention.**

| Variable | Retention | Frequency | Percent |
|---|---|---|---|
| Average knowledge score at follow-up as percent of score at the end of training **(Mean=68.79)** | Less than 50% | 23 | 12.8 |
| | 50% -75% | 92 | 51.1 |
| | 75% -100 Percent | 58 | 32.2 |
| | More than 100% | 7 | 3.9 |
| **Total (n)** | | **180** | **100** |
| Average patient encounter skill score at follow-up as percent of score at the end of training **(Mean= 73.80)** | Less than 50% | 23 | 12.8 |
| | 50% -75% | 62 | 34.4 |
| | 75% -100 Percent | 84 | 46.7 |
| | More than 100% | 11 | 6.1 |
| **Total (n)** | | **180** | **100** |
| Average clinical decision-making skill score at follow-up as percent of score at the end of training **(Mean= 82.84)** | Less than 50% | 4 | 2.2 |
| | 50% -75% | 38 | 21.1 |
| | 75% -100 Percent | 117 | 65 |
| | More than 100% | 21 | 11.7 |
| **Total (n)** | | **180** | **100** |
| Average clinical procedure skill score at follow-up as percent of score at the end of training **(Mean 87.58)** | Less than 50% | 3 | 1.7 |
| | 50% -75% | 42 | 23.3 |
| | 75% -100 Percent | 82 | 45.6 |
| | More than 100% | 53 | 29.4 |
| **Total (n)** | | **180** | **100** |

**Table 3. Mean difference of competency retention among independent variables.**

| Follow up score as percentage of score at the end of training | Independent Variables | | | | | | |
|---|---|---|---|---|---|---|---|
| **Age** | | | | | | | |
| | | **Mean** | **SD** | | **Mean** | **SD** | **P** |
| Average knowledge | **< 40 (n=80)** | 74.5 | 15.1 | **>= 40 (n=100)** | 64.2 | 17.8 | <0.001 |
| Average patient encounter skill | | 73.1 | 18.2 | | 74.4 | 17.9 | 0.641 |
| Average clinical decision-making skill | | 83.6 | 11.1 | | 82.2 | 15.3 | 0.496 |
| Average clinical procedure | | 90.1 | 15.1 | | 85.6 | 19.4 | 0.082 |
| **Cadre** | | | | | | | |
| Average knowledge | **HA (n=33)** | 73.87 | 19.56 | **AHW (n=147)** | 67.65 | 16.74 | 0.063 |
| Average patient encounter skill | | 77.81 | 17.73 | | 72.91 | 18.01 | 0.158 |
| Average clinical decision-making skill | | 84.27 | 12.92 | | 82.52 | 13.71 | 0.505 |
| Average clinical procedure skill | | 91.45 | 13.88 | | 86.71 | 18.35 | 0.165 |
| | **Average patient load** | | | | | | |
| Average knowledge | **<= 15 per day (n=104)** | 68.0 | 17.4 | **> 15 per day (n=76)** | 69.8 | 17.4 | 0.489 |
| Average patient encounter skill | | 70.1 | 18.6 | | 78.8 | 16.0 | 0.001 |
| Average clinical decision-making skill | | 82.7 | 12.9 | | 83.1 | 14.5 | 0.846 |
| Average clinical procedure skill | | 86.6 | 18.3 | | 89.0 | 16.8 | 0.373 |
| **Enabling Environment** | | | | | | | |
| Average knowledge | **< 60 %(n=89)** | 65.7 | 16.2 | **>= 60 %(n=91)** | 71.8 | 18.1 | 0.018 |
| Average patient encounter skill | | 70.9 | 18.6 | | 76.7 | 17.0 | 0.029 |
| Average clinical decision-making skill | | 82.5 | 13.5 | | 83.2 | 13.7 | 0.723 |
| Average clinical procedure skill | | 88.4 | 17.7 | | 86.8 | 17.7 | 0.53 |

**Table 4. Mean Difference of competency retention with geographic location.**

| Follow up score as percentage of score at the end of training | Geographic location | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mountain (n=44) | | Hill (n=97) | | Terai (n=39) | | P |
| | Mean | SD | Mean | Mean | SD | Mean | |
| Average knowledge | 68.1 | 15.0 | 72.6 | 17.9 | 60.1 | 15.7 | 0.001 |
| Average patient encounter skill | 79.5 | 17.1 | 71.9 | 18.0 | 72.3 | 18.1 | 0.055 |
| Average clinical decision-making skill | 86.2 | 12.8 | 81.7 | 13.8 | 81.9 | 13.5 | 0.162 |
| Average clinical procedure skill | 88.1 | 16.0 | 88.2 | 17.8 | 85.5 | 19.5 | 0.714 |

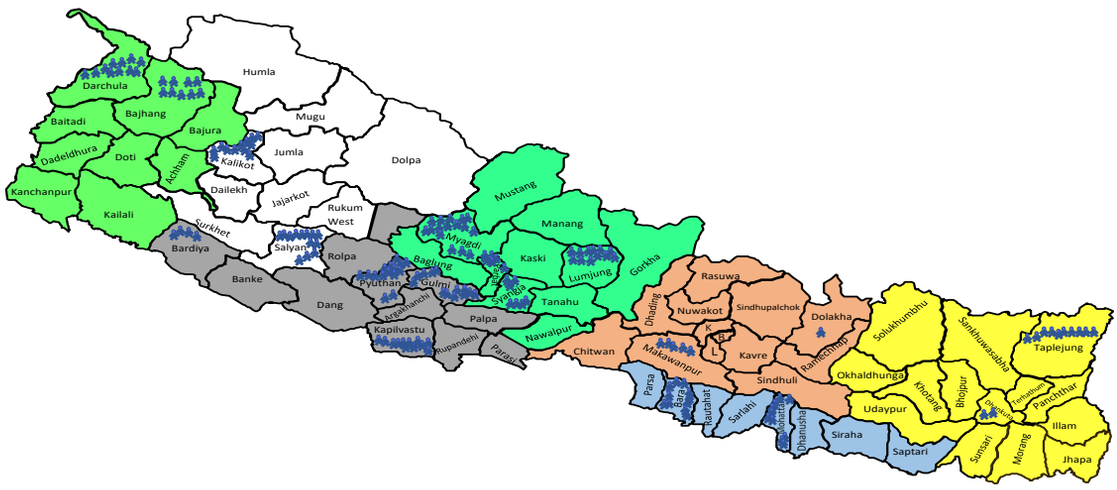


**Figure 1. Distribution of study units (MLPs)**

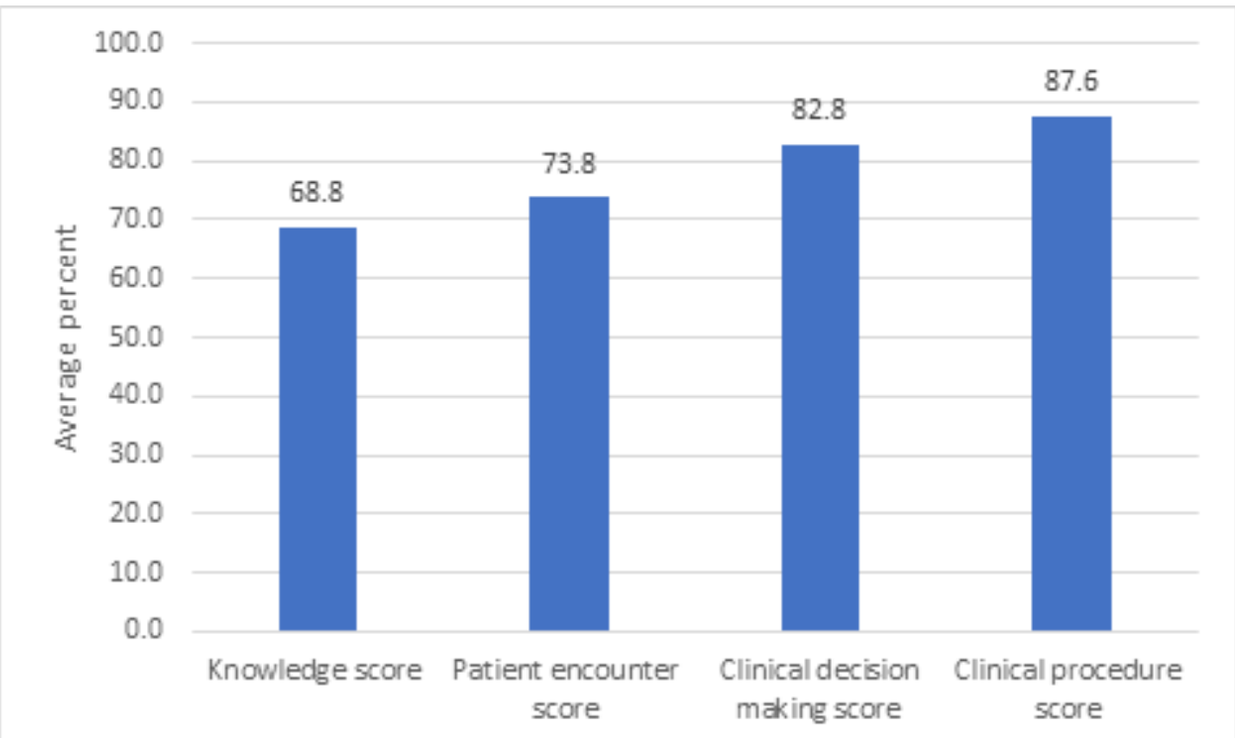


**Figure 2. Average competency retention among MLPs at onsite follow-up.**

## DISCUSSION

Among MLPs included in this study, there were no variations on competency retention on skill domains. Skill domains are predominantly important in competency for its practical application. Hence, skill retention at onsite follow-up can be generalized for all MLP trained cadres. However, the knowledge domain of competency retention was surprisingly found to be lower in the Terai region.

There are limited skill assessment studies carried out in Nepal. A clinical skill assessment for mid-level paramedics in 2007 suggested various factors such as years of experience, type of cadre, and geographical location were not significantly associated with the skill scores.[11,13] Similarly, this study identified no variation on skill domains retention in respect to geographic location, age, sex, years of experience, level of health facility and type of cadres.

This study suggests that retention of competency at follow-up was higher for all skill domains in comparison to knowledge. In this regard, the authors believe that

MLPs were devoid of opportunities for regular updates on knowledge and have limited opportunity for continuing medical education. In contrast, MLPs retained skills fairly well because it was feasible to apply their basic clinical skills in their workplace after the training.

A study carried out in Mozambique in 2015, among mid-level workers found the follow-up score on three domains: clinical decision-making skill (60%), knowledge (62%) and patient encounter skill (47%) respectively on chronic disease after revised training. At the same time, the study suggested the retention was significantly affected by young age, male, unmarried and working in higher health facilities. [14] Though, the test instrument and content in our study was different which reflected higher average retention score for clinical decision-making skill (82.8%), knowledge (68.8%), and patient encounter skill (73.8%) respectively. In contrast to previous findings , the average mean difference found affected in age only, the younger scored higher on the knowledge domain at follow-up assessment.

Shortages and turnover of skilled health workers are critical issues in many countries which prevent national health systems from meeting the needs of populations and achieving the sustainable development goal of universal health coverage. The Fourth Global Forum on Human Resource of Health 2017 anticipated a shortfall of 18 million health workers which is prominent for low- and middle-income countries (LMICs).[2]

The findings of this study showed 81% of MLPs retained in the same health facility during onsite follow-up visits. The average years among retained MLPs was 9.5 years. This finding affirms that trained health workers are staying in the remote health facility for a longer period with good retention of competency.

The MLPs working in health facilities with higher caseload retained patient encounter skills significantly better compared to lower caseload health facilities. This finding suggests that higher the caseload, greater the opportunity to practice on; history taking, physical examination, diagnosis and treatment for better retention of patient encounter skill. However, a similar principle applies with the clinical decision-making skill and clinical procedure skill but the retention was not found significantly different among health facilities with higher caseload.

Geographic variation was observed as MLPs of Terai region of Nepal had significantly lower knowledge retention than that of Hilly and Mountainous regions. The possible reasons for lower retention might be the socio economic and linguistic barriers. Majority of MLPs from the Terai region have a different native language other than Nepali, whereas the multiple-choice questions for knowledge assessment were presented in Nepali language. This assumption is supported as the skill assessment did not show any geographical variations where the language barrier was not a factor, as the skill is observed by a trainer using a skill checklist.

In general, it can be assumed that Health Assistants (HA) would score higher in knowledge and skill during their assessment, as HA have longer duration pre service medical education (>one year) than that of AHW. This study suggests there is no significant difference in competency retention between these two cadres. The reason for similar scoring may be due to basic competency being assessed in practical aspects. MLP training is problem-based learning which utilizes skill checklists and algorithms repeatedly for clinical procedure, clinical decision-making and patient encounter resulting in similar retention. The authors believe that the working pattern and opportunity of practice is similar for them before and after the MLP training. The other reason for similar retention outcomes is perhaps the pre-service curriculum for both cadres are similar. The difference in pre-service curriculum is only that the basic science section is added in HA curriculum.[15,16]

Knowledge and skill retention did not vary among the MLPs working in higher level of health facilities (District Hospitals and PHC) and Health Posts. Nevertheless, it was assumed that MLPs working at higher health facilities had more case exposure and received feedback from colleagues and seniors. The finding may be supported by the fact that the MLP training package is being designed to prepare mid-level health workers ready to work in health posts where lab tests and X-rays are not available. Similarly, the measurement tools were designed to measure basic procedures, patient encounter and clinical decision- making skills targeting peripheral level.

In general, a better enabling environment enhances skill retention and vice-versa is expected. In this study, a better enabling environment was significantly impacted with knowledge and patient encounter skill retention. However, it is unknown whether a better enabling environment leads to better competency retention or whether the better competency created a better enabling environment.

This study had certain limitations. Only followed up graduates of MLP were included in the study period that restricted randomization opportunities as we used stored data retrospectively. Exclusion criteria squeezed sample size by around 10%. Other qualitative variables could not

be included in this study like attitude, community and management support to the MLPs and MLPs subjective narration regarding competency retention.

## CONCLUSIONS

Among MLPs, the skill domain retention was higher than knowledge. During follow-up visits, the MLPs retention in the same health facility is found to be 81% with an average of 9.5 years of work experience. Amid the associated variables; the higher age, higher years of experience, and MLPs from Terai region retained significantly low knowledge whereas enabling environment and higher caseload was found to have significantly high patient encounter skill.

The study revealed that the retention of MLPs in their workplace and of their clinical competencies after training was impressively higher. Thus, NHTC needs to expand the training capacity with assuring quality to cover the large number of its cadres. After clinical training, follow-up provides an opportunity to ensure the current situation of trained workforce and their competency status. Therefore, follow-up at their workplace is highly recommended. Current modality of mixed batch intake of HAs and AHWs is coherent because there is no significant difference in the competency retention among these cadres. Hence, it is suggested to run a heterogeneous group as currently practiced. Since, MLPs from the Terai region scored low knowledge retention, a further study is required to explore its associated factors.

## CONFLICT OF INTEREST

None.

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