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Original Research Article

Determinants of successful transition from adolescent to adult HIV treatment in Zambia: a facility-level based comparative study

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ABSTRACT

Background: Successful transition from adolescent to adult care has not been extensively evaluated, in Zambia. The study aimed to assess the relationship between facility-based socio-demographic traits and successful transition to adult HIV care, in Zambia.
Methods: A retrospective descriptive cross-sectional analysis of 7275 patient files from 718 PEPFAR sponsored facilities. Data was extracted from the National Electronic Health Record (EHR) system and imported into STATA SE v-16 for analysis. Descriptive statistics were calculated on socio-demographic features and facility-level performance. Logistic regression was used to analyse the association between level of facility and successful transition to adult care, comparing third level facilities to lower-level facilities. Chi-square was employed to evaluate the association between socio-demographic traits and effective transition outcomes at a significance level of 0.05.
Results: 43.2% had successfully transitioned to adult care. Health posts performed the best, with 57.3% of patients successfully transitioning to adult care. The study found that health post type, private ownership, rural location, and province were significant factors in successful transition. Adolescents in lower-level facilities had a 59.9% success rate compared to those in third-level facilities.
Conclusions: The study stresses the importance of health system structure and posits that successful transition depends on many factors, not simply adolescent traits.

Keywords: Adolescents, Adult HIV, Facility-level, Transition, Viral load suppression

INTRODUCTION

The progress of pediatric antiretroviral therapy (ART) and treatment services is hampered by risk and vulnerability. A report by World Health Organization WHO, indicated that, by the end of 2022, there were approximately 39.0 million individuals living with HIV, with a range of 33.1 to 45.7 million.[1] Out of these, 25.6 million, which accounts for two-thirds, reside in the WHO African region. A projection by UNAIDS and WHO in 2023 pegged a total of 1.5 million adolescents living with HIV. UNICEF on the other hand, in its 2023-report titled "to ramp up our efforts in the fight against AIDS, observed that, adolescents and young individuals constitute an increasing proportion of the global population affected by HIV, with a total of 480,000 young individuals contracting HIV in 2022.[2] Among them, 140,000 were adolescents aged 10 to 19. The report further posited that, if current trends continue, there will still be some 183,000 annual new HIV infections among adolescents in 2030.

The advancement of antiretroviral therapy (ART) has transformed prenatal HIV infection from a fatal illness into a chronic, controllable infection that necessitates ongoing care.[3,4] Masese, observed that, the expansion of

anti-retroviral therapy has allowed numerous children with HIV to live into adulthood, necessitating the transfer of their medical care to the adult HIV clinic.[5] This growing group is confronted with a slew of new challenges, including the movement of adolescent patients from pediatric to adult-focused care, feelings of fear and hesitancy. The following problems have been identified in studies: moving service locations, accepting responsibility for one's own health and illness management, losing social connections established in the teenage clinic, the sudden and direct approach used to initiate the shift, social stigma, financial limitations, and a diminished standard of healthcare in the adult clinic.[3,5,6] These challenges may lead to poor health outcomes such as viral-non-suppression, if an abated.[7]

The highlighted challenges above can be offset with structured transition programmes. Studies have shown that structured transition programmes can support adolescents living with HIV to successfully transition into adulthood.[8] High-income countries tend to easily overcome the barriers to successful transition due to well-developed infrastructure and specialization that allows for change of clinic or providers and the availability of tested transition models of care.[6]

However, the reality is different in most sub-Saharan countries. The care model is primarily non-specialist, adults and children are seen by the same staff in the same location, and procedures vary between different facilities in the country.[9] The implication therefore is that many of these adolescents remain largely underserved, and their unique HIV care needs, as well as how those needs evolve as they grow older, are poorly recognized, according to various studies.[10-12] This is even though adolescents are a susceptible populace that faces developmental, psychosocial, and comorbidity issues on the one hand, and more health-related challenges on the other, including clinical problems related to long-term virus exposure, drug toxicity, metabolic and cardiovascular disorders, chronic lung disease, renal, and neurocognitive disorders.[3] Similarly, the new data on HIV-infected youth's outcomes after transition is alarming, since most studies show low retention and high mortality rates among adolescents and young adults following transition. Additionally, 19.8% of transitioned 21-year-olds were lost to follow-up after their 22nd birthday.[13]

The predominantly non-specialist care model is emphasized even more in Zambia's current tiered health-care system. Health care in Zambia is divided into five tiers, with health posts serving a population of 3500-7000 people at the lowest level. They are generally operated by nurses or community health aides and provide a very basic level of care with a primary focus on prevention. The second level includes health centres, which serve populations of 10,000 to 50,000 people and are generally operated by nurses. First-level hospitals, on the other hand, serve a population of 80,000 to 200,000 people and employ a wide spectrum of personnel, including but not limited to doctors and nurses. These institutions provide basic diagnostic and surgical treatments to facilitate referrals from health centres. Second-level hospitals serve a population of 200,000 to 800,000 people and provide the first level of specialist services.

Third-level facilities serve a population of over 800,000 people and provide both expert and subspecialist services, as well as serving as training and teaching platforms for universities. Most health services are provided at the primary health care level, which includes health centres and health posts, as well as level 1 hospitals to a lesser extent. Private institutions are either for profit and tend to be concentrated in the country's larger cities, or they are non- profit and run by faith-based organizations.[14]

By 2018, Zambia had over 62 000 verified HIV-positive children, with only 79 percent on antiretroviral therapy (ART) and 3000 AIDS-related deaths each year.[15] Pediatric ART is available at the primary health care level, and a specialized unit is housed at the University Teaching Hospital (UTH), Zambia's largest hospital. The consequences of the transition from pediatrics to adult care have not been well reported. This study assesses facility-type based determinants of successful transition of adolescents to adult HIV care, as well as assessing the association between socio-demographic factors and successful transition to adult care.

Transitioning from adolescent HIV care to adult services is becoming increasingly important for adolescents to maintain outstanding outcomes. Furthermore, a well-defined transition programs can help HIV-positive adolescents successfully transition into adulthood.[16] South Africa for example, estimates show that, 320,000 adolescents living with HIV (ALHIV) are expected to switch from pediatric to adult antiretroviral treatment (ART) by 2028.[8] However, while the fore mentioned is true, there has been a lack of agreement on the best measures for measuring transition and its results.[17] This sad reality is mostly true in most developing countries as opposed to developed countries. For instance, the American Academy of Pediatrics developed recommendations for HIV-related care transition to improve the transition process for adolescents infected with HIV.[18]

In Zambia, there is inadequate data on adolescent transition outcomes into adult ART care, compared to data on adolescent adherence and retention to care.[19,20] Several process flaws, such as inadequate employee training and a lack of human resources, were discovered to have an impact on transition.[19] The findings of this study reflect the difficulties that most poor countries, including Zambia, face. After working on an HIV project and visiting facilities around the country in both urban and rural settings, one repeating feature is that both pediatric and adult ART patients are seen by the same clinical team. As a result, it denotes a lack of suitable specialism. According to studies, poor care quality has a

detrimental impact on transition to care.[20]

Many studies have identified stigma, fear, and a lack of preparation prior to transition as key elements that have influenced the transition process.[21,22] Other research has found that barriers to transition can be classified on several levels: intrapersonal (e.g., poverty; lack of adequate nutrition), interpersonal (e.g., disrespectful treatment by providers), institutional/facility (e.g., lack of adolescent specific services), and community (e.g., lack of collaboration among organizations; social norms).[20] Other studies have postulated that factors such as having acquired a tertiary education, trusting peer educators for HIV treatment, having received counselling on transition to adult services, having visited an adult clinic to prepare for transition, had a higher likelihood of a successful transition.[23]

These studies indicate that transitioning HIV-positive adolescents requires intentional and effective interventions that address several elements at the individual, provider, and system levels, despite the complexity of the process.

Statement of the problem

Since the introduction of pediatric antiretroviral therapy (ART) in the early 2000s, considerable progress has been made in the treatment of HIV-positive children. However, particularly in sub-Saharan Africa, there is a scarcity of data on how institutional determinants influence successful transitions from adolescent to adult care.[24] Most published studies on adolescent transition originate from high income countries (HICs) in North and South America, where the fundamental transition pattern is from specialized pediatrics to specialized adult care. The application of this concept, support recommendations, and implementation tactics in low-income countries (LICs) like Zambia, which have limited resources, high HIV rates, and insufficient specialized human resources, remains unknown. Similarly, the few research studies conducted in sub-Saharan African imply that transition pathways and standard implementation are significantly more fluid and variable.[24,25]

Zambia has around 72,000 HIV-positive children aged 0-14 years, many of whom will have to transition at some time in their life.[15,26] However, the lack of clear and succinct elaborated factors that lead to successful transition, as well as a lack of data on institutional characteristics and how they may contribute to successful transition across facilities, continue to stymie the transition process. It's critical to evaluate facility-based relationships in the transition of adolescents to adult HIV care, as well as the relationship between certain demographic and socioeconomic parameters. This is because disconnection from care during or after transition can result in a variety of problems, including multidrug-resistant virus strains, deteriorating immunological function, increased morbidity and mortality, and an increased risk of infection.[27-29] With solid interventions based on high-quality research findings, these consequences should be prevented or at the very least reduced to negligible levels. As a result, the current study is required.

Main objective

To evaluate the relationship between socio-demographic characteristics and successful transition to adult HIV care, as well as to analyse facility-type-based performance in the transition of adolescents to adult HIV care.

Specific objectives

To determine how successful adolescent transitions to adult care differ depending on the type of facility. To evaluate viral load suppression rate among successfully transitioned adolescents. To assess the relationship between facility-type's socio-demographic characteristics and successful transition for adolescents transitioning into adult care.

Research questions

How do successful adolescent transitions to adult care differ depending on the type of facility? What is the viral load suppression rate among successfully transitioned adolescents? What is the relationship between facility-type's socio-demographic characteristics and successful transition for adolescents transitioning into adult care?

Hypothesis

H_0: 3rd level facilities do not have a higher successful transition performance of adolescents to adult care than lower-level facilities.

H_1: 3rd level facilities have a higher successful transition performance of adolescents to adult care compared to lower-level facilities.

Justification

The findings will add to the body of information and expand what is known about successful transition from adolescent to adult HIV care in Zambia, and particularly in sub-Saharan Africa. Similarly, the findings may contribute to the creation of sound interventions aimed at improving the quality of transitional services from adolescents to adults in Zambia.

Research gap

In Zambia, there is inadequate data on transition outcomes that focuses on the following: facility type: 1st, 2nd, 3rd, health facility, and health posts; geographical location: urban, peri-urban, and rural; and ownership: general public, private, military, and faith based.

Most of the research looked at interpersonal, intrapersonal, poverty, stigma, a lack of adolescent-specific services, and poor nutrition as important contributors to good transitional outcomes.[20] Similarly, the facilities in the country that provide ART services are not specialized (apart from pediatrics centre of excellence). There is a pressing need for research that can evaluate the facility type, location, and ownership aspects that influence vis-a-vis successful transition. Hence, the current study.

METHODS

Study design

This was a 5-year retrospective descriptive cross-section study of HIV positive adolescents aged 15 to 19 years who switched to adult HIV care between 2016 and 2020. The National EHR (SmartCare databases) from PEPFAR-supported health facilities that provide HIV care to both adolescents and adults were used to compile detailed information on the teenagers' transition. This cost-effective study design was chosen because it allows for a quick and efficient assessment of the quality of the teenagers' transition to adult HIV care. Its key flaw was the lack of socio-demographic and socio-economic data to aid in determining transition quality.

Study population

As of December 2016, there were 7,275 adolescents aged 15 to 19 years who had their most recent clinical visit, pharmacy visit, and Adult ART contact in 2020, from over 718 PEPFAR-supported facilities providing ART using the National Electronic Health Record (EHR) system in all ten provinces of Zambia.

Data collection

Between January 2016 and December 2020, de-identified patient level data was retrieved from the EHR known as SmartCare. The records had to be of patients between 15 and 19 years old when they were cut off.

Data analysis

For analysis, the cleaned data extract was imported into STATA SE v-16 StataCorp LLC, College Station, TX. The dependent variable was created using the most up-to-date HIV/AIDS standards, which included pharmacy and clinical visits. Descriptive statistics were used for socio-demographic characteristics of facilities, which were then expressed using frequency tables. The researchers utilized logistic regression analysis to determine if third-level facilities were better in transition than lower-level facilities. The first regression model was run with no control variables, whereas the second was adjusted to account for location, ownership, and gender. Facility-level successful adolescent transition to adult care was determined using frequency tables. Similarly, at a 95% confidence interval, Chi-square was utilized to assess the association between socio-demographic traits and successful transition outcome.

The study variables were classified as follows:

Independent variables

Facility type

According to tiered health system levels described as; health post, health centre, primary denoting district or level 1 hospitals, secondary denoting regional or level 2 hospitals and tertiary denoting central and teaching hospitals or level 3 hospitals.

Province

The facilities were drawn from the 10 provinces in Zambia.

Location

It was divided into urban, rural, and peri urban.

Ownership

It was divided into Government facilities, held by the Ministry of Health and the military and privately owned for profit and faith-based facilities.

Dependent variables

Successful transition into adult care

Yes- known pediatric HIV patient with subsequent non-pediatric clinical interaction, who was virally suppressed at time of transition (<1000 copies) and has at least one recent pharmacy visit in the last 6 months.

No- any known pediatric HIV patient, eligible for transition and not fitting criteria above.

Inclusion criteria

Age range: adolescents aged 15 to 19 years at the time of transition to adult HIV care, based on the National EHR (SmartCare) records. Transition to adult care: adolescents who transitioned to adult HIV care between 2016 and 2020 from PEPFAR-supported facilities using the National EHR. HIV status: only HIV positive adolescents who have clinical, pharmacy, and adult ART records in the SmartCare databases were included in the study.

Exclusion criteria

Age outside specified range: adolescents younger than 15 or older than 19 at the time of transition to adult HIV care. Incomplete transition records: adolescents with

missing or incomplete records of clinical visits, pharmacy visits, or ART contact in the National EHR during the study period. Non-PEPFAR facilities: adolescents from health facilities not supported by PEPFAR or those without proper integration into the National EHR system.

Ethical consideration

The study received ethical approval from both the University of Lusaka's School of Medicine and Health Sciences Ethics Committee and the National Health Research Authority (NHRA). After that, a letter of authorization to access the EHR database was issued. The information was obtained in a de-identified format. Moreover, during the thesis, the ethos of justice, maleficence, and confidentiality were upheld.

RESULTS

Demographic characteristics

The study's findings revealed that a total of n=7275 clients were extracted from 718 PEPFAR supported sites on the E.H.R database. The mean age of clients was 18.3, (SD-1.55). In terms of facility-type; majority of the clients, 57.06% (n=4151) were classified under health centres and the least, 3.57% (n=260) of clients, were from health posts. Additionally, 83.44% (n=6070) were females, as for ownership, Government of the Republic of Zambia (GRZ) had 87.67% (n=6378) clients, while the Military had the least, with 0.70% (n=51). Furthermore, majority participants 67.8% (n=4934) were in urban settings, with Lusaka province contributing the highest number, 32.2% (n=2202).

Table 1: Facility-type socio-demographics for participants.

Variables		Frequency (n=7275)	Percentage	Cumulative (%)
Facility-type	Level 3- tertiary	1257	17.28	17.28
	Level 2- secondary	353	4.85	22.13
	Level 1- primary	1254	17.24	39.37
	Health centre	4151	57.06	96.43
	Health post	260	3.57	100.00
Total		7275	100	
Sex	Male	1205	16.56	16.56
	Female	6070	83.44	100.00
Total		7275	100	
Ownership	GRZ	6378	87.67	87.67
	Faith based	671	9.22	96.89
	Private	175	2.41	99.30
	Military	51	0.70	
Total		7275	100	

Table 2: Facility-level's successful adolescent transition to adult care.

Variables		No, N (%)	Yes, N (%)	
Facility type	Level 3-tertiary	746 (59.3)	511 (40.7)	1257
	Level 2-provincial	214 (60.6)	139 (39.4)	353
	Level 1-district	786 (62.7)	468 (37.3)	1254
	Health centre	2273 (54.8)	1878 (45.2)	4151
	Health post	111 (42.7)	149 (57.3)	260
Total		4130	3145	7275

Table 3: Viral load suppression rate among participants.

		No, N (%)	Yes, N (%)
Adult transition	No	263 (24.4)	816 (75.6)
	Yes	209 (7.1)	2734 (92.9)
Total		472	3550

The study found that 43.2% of adolescents (n=3145) effectively transitioned to adult care during the study period. Most crucially, health posts performed well in transition, from a total of n=260, 57.3% successfully transitioned to adult ART.

The data in Table 3 demonstrated that 92.9 percent (n=2734) of transitioning individuals were virally suppressed, whereas 7.1 percent (n=209) were not.

The Chi-square test findings in Table 4 demonstrate that the p value was less than the conventional alpha value (0.05) for the following independent variables: facility-type has a p value of 0.0001, ownership has a p value of

0.011, location has a p value of 0.000, and province has a p value of 0.000. This suggests that the four (4) independent variables have a substantial relationship with adolescent transition.

Table 5 demonstrates transition at a health post is 1.96 times (or 96%) more likely than at a level 3 institution. In terms of location, transition at a rural or peri-urban context was 1.5 and 1.3 times more likely than those in urban settings. Furthermore, transition at a private health facility was 1.8 times more likely than at the public (GRZ) institutions in terms of ownership.

Table 4: Association between socio-demographic traits and transition outcome.

Variables	Frequency (n=7275)	Percentage	P value
Facility-type			
Level 3- tertiary hospital	1257	17.28	0.0001**
Level 2- provincial hospital	353	4.85	
Level 1- district hospital	1254	17.24	
Health centre	4151	57.06	
Health post	260	3.57	
Total	7275	100	
Sex			
Male	1205	16.56	0.311
Female	6070	83.44	
Total	7275	100	
Ownership			
GRZ	6378	87.67	0.011*
Faith based	671	9.22	
Private	175	2.41	
Military	51	0.70	
Total	7275	100	
Location			
Urban	4934	67.82	0.000**
Rural	1729	23.77	
Peri-urban	612	8.41	
Total	7275	100	
Province			
Central	618	8.49	0.000**
Copperbelt	1223	16.81	
Eastern	640	8.8	
Luapula	309	4.25	
Lusaka	2202	30.27	
Muchinga	186	2.56	
North-western	256	3.52	
Northern	354	4.87	
Southern	898	12.34	
Western	589	8.1	
Total	7275	100	

Robust cieform in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Logistic regression for higher transition performance between 1st to 3rd level and lower facilities.

Variable	Adolescent transition	Adolescent transition
Facility type	Crude OR (95% CI)	Adjusted OR (95% CI)
Level 2-provincial hospital	0.948 (0.745-1.207)	0.9658 (0.745-1.252)
Level 1-district hospital	0.869 (0.740-1.021)	0.769 (0.650-0.911)
Health centre	1.206** (1.061-1.371)	1.096 (0.961-1.250)
Health post	1.959*** (1.496 - 2.568)	1.599*** (1.213-2.108)
Location		
Rural		1.487*** (1.318 -1.678)
Peri-urban		1.253** (1.055 -1.488)

Variable	Adolescent transition	Adolescent transition
Facility type	Crude OR (95% CI)	Adjusted OR (95% CI)
Ownership		
Faith-based		0.999 (0.828-1.206)
Private		1.825*** (1.336 - 2.494)
Military		0.745 (0.416-1.331)
Sex		
Female		1.028 (0.095-1.167)

Robust cieform in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

DISCUSSION

Successful adolescent transitions to adult care differ depending on the type of facility

The study found that 43.2% successful transition rate from 718 facilities. This was higher compared to another study, which reported a 20.4% successful transition to adult care.[12] Both studies on the other hand, appear to agree that addressing the complex transition experiences of adolescents, beyond the models of care advanced by high-income countries, can improve successful transition outcomes. Working on a project for the past two years to implement the National EHR in health care facilities, with a focus on ART treatments, has solidified my conviction that transition problems such as disclosure of status, counselling, and preparedness are complex and difficult to administer in most settings. One the other hand, it is consistent to note that health posts performed best in transitioning adolescents to adult ART care, with a success rate of 57.3%, followed by health centres with a success rate of 45.2%, according to the research. This pattern is explained by the fact that primary health care is strongly and totally implemented in these contexts.

Viral load suppression rate among successfully transitioned adolescents

According to the findings of the study, viral load suppression process is critical as an HIV transmission prevention method that should be implemented and encouraged by all, as evidenced by the 92.9 percent viral load suppression rate among those who successfully transitioned. It also tends to promote better treatment outcomes. Similarly, a comprehensive and thoughtful conceptualization of challenges associated to teenage transition to adult care is important to create programs and treatments that would improve facility-based performance.

Relationship between facility-type's socio-demographic characteristics and successful transition for adolescents transitioning into adult care

Socio-demographic parameters such as location, ownership and facility type were found to have an impact on the effective transition outcome in the current study. In terms of location, institutions located in rural and peri-urban areas performed better than those located in metropolitan areas. This could be because primary healthcare is more effective at lower-level facilities and rural settings, even though lower-level facilities in Zambia are bound to be more resource constrained. On the other hand, they (lower-level facilities) tend to rely on the ethos and benefits of a traditional community notion marked by close connections, a profound sense of care for one another, and a sense of purpose.[3]

When it comes to ownership; privately owned facilities function better than those operated by the government. This is because, privately owned health facilities operate on strict out-of- pocket and medical insurance as key financial pillars in service provision, as opposed to public institutions that rely on donor and government supported grants to offer health services.

Lower-tier have better transition outcomes than higher-tier ones

Zambia's health-care system is decentralized and divided into three parts: hospitals, health centres, and health posts. Hospitals are further divided into three categories: first level (primary), second level (secondary), and third level (tertiary). The study found that the sort of institution where teenagers attend has an impact on the success of transition outcome. An adolescent who receives treatment at a health post is 1.96 times (96%) more likely to transition to adult care than those who receive treatment at a level 3 facility.

Despite the fact that the effect size for health post fell when other predictor variables were controlled for, adolescents were still 1.59 times more likely to move to adult care. In terms of facility location, an adolescent receiving HIV care from a rural or peri-urban facility was 1.5 and 1.3 times more likely to transfer to adult treatment than those receiving care in urban settings respectively. When it came to facility ownership, an adolescent receiving HIV care from a private health facility was 1.8 times more likely than those from government facilities to move to adult treatment. Sex, on the other hand, was found to be unimportant. A successful transition performance borders on many factors, chief among them is preparation. A good transition performance is dependent on a number of things, the most important of which is preparation. In a study of 223

adolescents from 11 health clinics in Cambodia, it was discovered that teenage preparation was a major determinant of a successful transition.[28] According to a comparable study, health systems and services, as well as a focused healthcare environment and employees, are critical.[29] The findings of the current study are supported by the observations that the staff-to-client ratio in health-care facilities favors a more focused and enriched client experience. Furthermore, primary healthcare services are more responsive and adaptable to community health care needs. Adolescents getting ART in lower-level facilities tend to form strong and long-lasting relationships with their care teams and fellow adolescents living with HIV, and eventually regard such relationships as an extended family.[29]

Strengths of this study are large cohort included into the dataset which powers the study to detect the differences in subgroup analyses. The study was able to demonstrate that despite what may be a common assumption, transitions from adolescent to adult HIV care were better at health posts than at specialized third level facilities. Further research in this area would be required to understand the underlying reasons for this.

There are some limitations also. There were inadequate data elements to track unique identification in relation to identifying clients who may have transferred and transitioned and ended up getting new identification or new smartcard. The characteristics of facilities were limited and could not be explored in detail to understand what makes lower-level facilities perform better. Predictors such as transport, health communication, number of health workers, transfer across facilities and literacy levels among clients could not be established in the data that was available, and thus were excluded from the regression model.

CONCLUSION

The 3rd level facilities did not have a higher successful transition performance of adolescents to adult care than lower-level facilities and this was statistically significant. Similarly, there was a 59.9% increase in higher successful transition performance from a lower-level facility compared to 3rd level facility, at 95% confidence interval. Similarly, findings revealed an association between transition outcome and the following socio-demographic variables; facility-type (health posts), ownership (private), location (rural) and province (Muchinga) with p values of 0.0001, 0.01, <0.001 and <0.001, respectively. The findings contest the implicit assumption of individual factors as chief determinants of transition outcomes.

Recommendations

There is a need to assess factors contributing to a better transition among lower-level facilities. There is need to conduct a qualitative assessment among clients on the experience of transition.

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