Pakistan Journal of Clinical Psychology, 2014, 13, 2, 3- 15 | PJCP

WASHING HANDS BEFORE MEALS OF A LONG-STAYING HOSPITALIZED SCHIZOPHRENIC PATIENT AND ITS TREATMENT THROUGH APPLIED BEHAVIOUR ANALYSIS: A CASE STUDY

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ABSTRACT

Objective: *The purpose of conducting the present study was to determine whether Applied Behavior Analysis implemented through token economy and social reinforcements could successfully address poor hygiene behavior (washing hands before meals) in a psychiatric hospital setting. It was hypothesized that there would be significant increase in washing hands before meals of a long-staying hospitalized schizophrenic patient after the application of Token Economy and Social Reinforcements.*

Place of Study*: Karachi, Pakistan*

Research Design*: Case Study*

Sample and Method: *The present study was conducted on a 44 year old female patient with chronic schizophrenia for the past 23 years. A functional analysis was conducted together with baseline observations. The entire study was divided into three main phases; pre-intervention, intervention and post intervention. These were pursued by follow-ups. An implementation design was developed together with hospital staff and the patient's guardian. The implementation phase was conducted by hospital staff with regular meetings with the researcher. Reinforcement during the intervention phase was initially through the provision of a star, selected from a sticker sheet of various coloured stars by the subject herself, with each star exchangeable for a candy during the first week (continuous reinforcement) in addition to social reinforcement from staff and family where possible (variable interval). During the second week, phasing out of the reinforcement was initiated with one candy for every 2 stars (fixed ratio) for the first three days, and then 1 candy for every 3 stars on average but given randomly during the last three days. Social reinforcement continued on a variable interval schedule throughout. Thus first phase consisted of continuous reinforcement with fading to a fixed ratio and then variable ratio in the second week, followed by post-observation and follow ups.*

Results: *Results indicated increase in washing hands before meals behavior in the intervention phase compared to the pre-intervention phase.*
Conclusion: *The results revealed that the techniques used were successful in increasing the target behavior that is washing hands before meals of the patient. The desired behavior was modified and the outcome supports the underlying construct of Applied Behavior Analysis.*

Keywords: *Washing hands before meals; token economy; social reinforcement*

INTRODUCTION

Applied Behavior Analysis (ABA) according to Cooper, Heron and Heward[1] is the science in which principles of behavior are applied to improve socially significant behavior and experimentation is used to identify the variables responsible for the improvement in behavior.

Applied behavior analysis is the process of systematically applying interventions based upon the principles of learning theory to improve socially significant behaviors to a meaningful degree, and to demonstrate that the interventions employed are responsible for the improvement in behavior. The use of ABA for long-staying patients at psychiatric hospitals has been repeatedly shown to be a highly effective means of improving desired behaviors in several countries; nevertheless, its systematic application in Pakistan is limited and not well documented.

Dickerson et al.[2]review how token economy is a treatment intervention based on principles of operant conditioning and social learning and the scientific evidence available for this. Developed in the 1950s and 1960s for long-stay hospital patients, token economy has fallen out of favor since that time, however, a total of 13 controlled studies of the token economy were reviewed and as a group, the studies provide evidence of the token economy's effectiveness in

[1] Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

[2] Dickerson, F. et al. (2005), The token economy for schizophrenia: *review of literature and recommendation for future research. Schizophrenia Research: 75* (2), 405-416. Retrieved from http://www.schresjournal.com/article/S0920-99 64(04)00313-5/abstract.

increasing the adaptive behaviors of patients with schizophrenia. Most of the studies are limited, however, by methodological shortcomings and by the historical context in which they were performed. More research is needed to determine the specific benefits of the token economy when administered in combination with contemporary psychosocial and psychopharmacological treatments. This result will attempt to develop further evidence for Pakistan in line with this recommendation.

Jones et al.[3] have demonstrated the neural basis for social reinforcement being an effective form of basic reinforcement learning. The probability of receiving positive social reinforcement from three distinct peers was parametrically manipulated while brain activity was recorded in healthy adults using event-related functional magnetic resonance imaging. Over the course of the experiment, participants responded more quickly to faces of peers who provided more frequent positive social reinforcement, and rated them as more likeable. This work highlights the fundamental influence of acceptance by one's peers in altering subsequent behavior. This project will utilize social reinforcement as a supplementary reinforcer.

Hackenburg[4] has reviewed previous research on token systems in relation to common behavioral functions- reinforcement, temporal organization, antecedent stimulus functions, and aversive control - emphasizing the distinctive features of token systems. He also describes the role of token procedures in the symmetrical law of effect, the view that reinforcers (gains) and punishers (losses) can be measured in conceptually analogous terms. Given that this research is focused on a token system for a simple behavior, without the use of a wider token economy at the institution, punishers were not used.

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[3] Jones, R. M. et al. (2011). Behavioral and Neural Properties of Social Reinforcement Learning. *Journal of Neuroscience: 37* (21), 13039-13045. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/21917787.

[4] Hackenberg, T. D. (2009). Token Reinforcement: A Review and Analysis. *Journal of Experimental Analytical Behavior: 91* (2), 257-286. Accessed on December 8, 2011 at http://www.ncbi.nlm.nih.gov/pubmed/ 19794838.

Comaty and Advocat[5] describe the outcome of a token economy treatment applied to two distinct patient populations on the same unit of a state psychiatric hospital: individuals with a dual diagnosis of mental retardation and a DSM-IV Axis I diagnosis of either (a) a severe behavior disorder (BD) or (b) a serious and persistent psychiatric disorder (PD). Results showed that patients in the PD group were more likely to complete the treatment (17/20) than those in the BD group (17/31) who were more likely to be terminated from the program (14/31). Individuals who did not complete the program were distinguished early, within the first 3 weeks of treatment.

These non-completers received significantly more fines and earned significantly fewer tokens than those who completed the program. At an average of 2.7 years post-discharge, there was no difference in the proportion of PD (12/16) and BD completers (9/11) and BD non-completers (3/7) remaining in the community. These data show that diverse populations of patients can be treated within the same token economy program, thereby improving cost effectiveness.

Lin et al.[6] explore the perceived experiences of psychiatric patients related to token therapy. A qualitative in-depth interview was applied to collect individual opinions and perceptions. The 13 patients included in this study, all of whom had been diagnosed with mental disorders, received a six-month program of token therapy. The three significant domains of experience of participants receiving token therapy included: (1) acknowledgement of token therapy significance, (2) appreciation of each step in terms of personal achievement, and (3) reinforcement from personal changes and family support. Findings support the application of token therapy in psychiatric rehabilitation settings using the strategy of applying appropriate positive or negative logos to communicate reinforcement in an immediate manner that is further enhanced by the public tracking of accumulated patient scores on an evaluation board. In this manner, the therapeutic environment is imbued with a critical empowerment function.

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[5] Comaty, J. E. & Advokat, C. (2001). Analysis of Outcome Variable of a Token Economy System in a State Psychiatric Hospital: A Program Evaluation. *Research in Developmental Disabilities: 22* (3), 233-254. Accessed on Dec 8, 2011 at http://www.ncbi.nlm.nih.gov/pubmed/11380061.

[6] Lin, M. F. et al. (2006). Significant Experience of Token Therapy from the Perspective of Psychotic Patients. *Journal of Nursing Research. 14,* (4) 315-323. Accessed on December 8, 2011 at http://www.ncbi.nlm.nih.gov/pubmed/17345761.

CASE STUDY

History and Presenting Complaints

AK is a 44 year old woman; she belongs to an educated, middle class, Punjabi family. The subject is the first born of two children, the second also being a girl, who was born two years after the subject. The subject's birth was much anticipated and was a natural birth with no reported complications. Her milestones were achieved without any concern regarding delays.

The subject's family moved to Italy when she was 1, and her father was posted to various countries over the next 12 years before their return to Karachi. Her early schooling was, therefore, marked by frequent changes in residence. She is reported to have used drugs recreationally before her departure to the U.S. at age 18 for college. In college she experimented with hallucinogens and also with lesbianism. By her final year in college she is reported to have noticeably neglected self care and displayed eccentric behavior. Her mother stated that she was admitted to hospital with a "mental breakdown" in the U.S. when she was 22 and diagnosed with schizophrenia.

Her parents travelled to the U.S. and brought her back to Pakistan after a month and the prognosis given at the time was poor. The subject's condition vacillated over the first 5 years and there was a general deterioration in her functioning. For the last 10 years she has been relatively stable and her father passed away 3 years ago after which there has been some improvement, perhaps because she now receives the mother's undivided attention. Encouraged by this change, the mother has admitted her to psychiatric rehabilitation center in an attempt to further improve the subject's functioning. She has now been at the facility for the last 3 months and shown some responsiveness to a new medication regime, although she is resistant to rehabilitation efforts in the day care and continually asks for her mother and to be allowed to return home.

Poor self care, in particular, washing hands before meals, generally appears to be self-motivated behavior for the patient. During pre-observation, it was noted that there is little, if any, insistence or attention given if she does not wash her hands prior to a meal by hospital staff. Her mother visits on alternate days at lunch and will occasionally prompt her to wash her hands before starting the meal but is also not insistent. She has, however, described previous efforts, particularly with regard to using soap adequately, and the resistant response

given by the patient. She has since stopped pursuing washing hands or getting upset if the subject does not wash her hands, and yet the behavior continues. The likely motivator does not have to make the effort to wash her hands and this satisfies her need for avoiding what she may perceive to be a "chore". It is, however, also possible that this is perceived, at some level, by the subject as being allowed by her mother to have her own way, and may thus satisfy her need for affiliation.

Due to the above mentioned reasons, this behavior was chosen as the target behavior. The aim of the study is, therefore, to improve washing hands before meals behavior of the patient through Applied Behavior Analysis techniques.

Measures

A demographic information form was used to gather information about the subject name, age, birth order, education and parental information. A permission letter was assigned from the hospital to get approval to conduct the study. A consent form was used in order to acquire permission from the subject mother.

Data was gathered through frequency method and it was decided to use a token system with a variety of candies as the reinforcer as this reinforcer is not only enjoyed by the subject but is also likely to be appreciated by a large majority of patients if this initiative is adopted as hospital policy. Similarly, social reinforcement is something that the patient desires and is also likely to be reinforcing for a variety of patients and will be used as secondary reinforcement. Social reinforces can operationally be define as any verbally or non-verbally praise including good, excellent job, smile, head nodding, etc.[7]

Treatment Strategies

The intervention consisted of 5 stages.

a) Pre-Observation: Psychiatric rehabilitation center was selected as the institution for the intervention due to the availability of long-staying

[7] Horn, T. S. (1987). The influence of teacher-coach behavior on the psychological development of children. In D. Gould & M. R. Weiss, Advances in pediatric sport sciences, *Behavioral Issues 2* Champaign, IL, Human Kinetics.

psychiatric patients. Both the psychiatric rehabilitation and in-patient services were considered as possible intervention areas and in-patient services were selected after review by the supervisor as patient stabilization and care are required prior to rehabilitative services. Research was undertaken regarding behavioral interventions in the target population to help plan the intervention. Meetings were held with the Board of Directors and senior management to ensure there is approval and ownership for the research and wider application of the intervention should it be successful. Meetings with mid-level management, ward staff and the patient's guardian were held to obtain the case history and plan the intervention. A training session was also held with staff who were to implement the intervention.

b) Baseline Observation: Conducted over 4 days during which the relevant staff, the "ayas" who bring in the meals, observed washing of hands before meals behavior of the subject and later recorded it on a form at the nursing station where a chart with the 8 hand-washing steps from the operational definition (with pictorials to show each step to the "ayas" who were illiterate) was maintained.

c) Intervention Phase: Divided into three periods, Week 1 consisted of 6 days of continuous reinforcement, followed by a break on Sunday when the doctor who is the ward in-charge is on holiday. The first day included a verbal explanation by the ward in-charge to the subject regarding the intervention. Ward in-charge personally implemented the intervention for lunch, while implementation for dinner was done by the evening "aya". Week 2 was divided into two 3 day phases with differing reinforcement schedules as described above.

d) Post-Intervention Phase: Observations over four days when reinforcers were withdrawn and washing hands before meals behavior recorded similarly to other phases.

e) Follow-up: One week after the post-intervention phase, a follow up was conducted to reassess the subject's washing hand before meals behavior and plan for extending the initiative.

Pre-Intervention

The subject was observed during the period starting from delivering the meal tray to her room and until she started her meal. During baseline observation, the subject did not even attempt to wash her hands on any day with the exception of lunch on one day when her mother was present, and despite a briefing to not prompt the subject, asked the subject to wash her hands. The subject, however, only wet her hands briefly and did not apply soap, thus, the incident did not qualify for washing hands as defined operationally for this study.

Intervention

Reinforcement during the intervention phase was initially through the provision of a star, selected from a sticker sheet of various coloured stars by the subject herself, with each star exchangeable for a candy during the first week (continuous reinforcement) in addition to social reinforcement from staff and family where possible (variable interval). The subject was also provided with a colorful diary to collect the stars. During the second week, phasing out of the reinforcement was initiated with one candy for every 2 stars (fixed ratio) for the first three days, and then 1 candy for every 3 stars on average but given randomly during the last three days. Social reinforcement continued on a variable interval schedule throughout.

In addition to the use of consumable reinforcers, staff and family were briefed to provide social reinforcers related to the cleanliness or good appearance of the subject's hands. These reinforcers were opportunistic and particularly emphasized during the second week when consumable reinforcers were being faded out.

Prior to the start of the intervention phase another meeting was held with the ward RMO in-charge and the aya who is present during the evening shift. A step by step description of the operationally agreed definition of washing hands before meals behavior was explained and demonstrated, and both participants who would be carrying out the intervention rehearsed the process of washing hands. In addition, a brief regarding how the token system would function, which was to be agreed with the subject, was also rehearsed. The subject was told that she would earn a star for each time that she washed her hands in the manner she was being taught, and that she would be given the choice of one candy from a bowl of selected candies, for each star. She was given a pink,

heart-shaped diary in which to collect stars and she was also shown the sticker sheet of stars from which she could choose any colour she liked. She was then shown how to wash her hands as per the operational definition at how own wash basin. She was given additional direction regarding changed frequency of reinforcers during the second week. Generally, the subject was highly cooperative, and in Doctor's words, "excited and happily willing" regarding washing hands before meals and the selection of stars and candy.

RESULTS

Table 1
Baseline observation of washing hands behavior before meals

Lunch & Dinner	Washing hands before meals
Wednesday	0
Thursday	0
Friday	0
Saturday	0

Table 2
Intervention phase of washing hands behavior before meals (1st week)

Lunch & Dinner	hand-washing	Reinforcements
Wednesday	1+1	Candy + Social Reinforcement
Thursday	0+0	No Reinforcement
Friday	1+1	Candy + Social Reinforcement
Saturday	1+1	Candy + Social Reinforcement
Monday	1+1	Candy + Social Reinforcement
Tuesday	1+1	Candy + Social Reinforcement

Table 3
Intervention phase with only social reinforcement of washing hands behavior before meals (2nd week)

Lunch & Dinner	hand-washing	Reinforcements
Wednesday	1+1	Social Reinforcement
Thursday	0+0	No Reinforcement
Friday	0+1	social Reinforcement
Saturday	1+1	Social Reinforcement
Monday	1+1	Social Reinforcement
Tuesday	1+1	Social Reinforcement

Fading of tangible reinforcement

Table 4
Post-Intervention phase of washing hands behavior before meals

Lunch & Dinner	hand-washing
Wednesday	1+1
Thursday	1+1
Friday	1+1
Saturday	1+1
Monday	1+1
Tuesday	1+1

No reinforcement

Table 5
Follow-ups of washing hands behavior before meals

Lunch & Dinner	hand-washing
Wednesday	1+1
Friday	1+1
Monday	0+0
Tuesday	0+0

No Reinforcement

DISCUSSION

The purpose of the present study was to improve washing hands before meals behavior of a long-staying hospitalized schizophrenic patient through the use of token economy and social reinforcements. After a complete treatment programme, the results proved to be highly successful.

It was noted that the patient did not wash her hands throughout in pre-intervention phase. The baseline phase result showed that the client did not wash her hands before meals that are lunch and dinner. Daily observation of five days showed her zero attempts of washing hands before meals behavior.

After completion of pre-intervention phase, token economy and social reinforcements was followed as a part of the treatment in intervention phase. The use of a token system and social reinforcement to improve hygiene behavior[8] [9], in the present study it was washing hands before meals. Two weeks of intervention phase of daily record of washing hands before lunch and dinner showed significant increased.

In the first intervention week the subject was given the candy tray to select a candy after each meal time, as well as social reinforcements by hospital staff in the ward and the day care program. In addition, the subject's family also remarked on the cleanliness and beauty of the subject's hands to her.

In the second intervention week, social reinforcement with fading to a fixed ratio and then variable ratio was used. Despite tapering off the consumable reinforcement, the subject's response remained positive. It was also decided to handover the lunch intervention to the afternoon aya instead of the ward in-charge. Results remained positive in the second week as seen in the table 3.

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[8] Segal, R. (1991). *A Study of patient responsiveness to a token economy at children psychiatric Hospital* (behavior modification). (School of Social Work, Adelphi University. U.S.E.). Dissertation Abstracts International, 10, p. 6537A.

[9] Filcheck, H. A. & McNeil, C. B. (2004). The use of token economies in preschool classrooms: practical and philosophical concerns. *Journal of Early and Intensive Behavioral Intervention, 1*(1), 94-104.

During the post-intervention week, all planned reinforcements by participants were eliminated. It is possible that some social reinforcement, particularly by the subject's mother may have continued. Results remained steady as can be seen in the table 4.

During the one week follow-up the patient was reported to have been seriously unwell for the past 3 days, running a high temperature and bed-ridden. The mother and hospital staff decided to tell the patient that it was not necessary for her to wash her hands due to her illness and, therefore, she had not washed her hands "only a couple of times" in the past three days at the time of the follow up. Nevertheless, it was reported that she had continued to wash her hands prior to the illness.

The fact that this intervention was part of a study that was also approved by the institution's Board of Directors may have impacted the effort made by staff. Nevertheless, it is important to note that during the implementation of this project the involvement, interest and excitement displayed by the staff regarding the intervention was palpable and could be seen as reinforcing in itself.

The subject's mother has requested that the intervention be continued to target additional hygiene behaviors, which she finds difficult to manage on her own, and which may allow her to take the patient back to her home sooner.

Limitations

It is important to note that the hospital staff and the mother initiated the process of the patient not washing her hands during her illness. Discretion and judgment both belong to these authorities in this regard and it may well have been the best course of action in the circumstance, however, it may be important in future initiatives to establish the need to maintain a high bar for suspending the target behavior and a clear process for the same. Through ABA procedures the patient's further hygiene can also be improved. In the present study only token economy and social reinforcement was used, shaping chaining and discrete trial training could also be use with the patients of schizophrenia. Further experimentation on non-schizophrenic patients, general ward patients and other behaviors, as well as staff motivational techniques are also recommended before making this hospital policy. Further research to test this potential and expand its use is highly recommended.

Conclusion

It can be concluded that the target behavior of washing hands before meals of a 44 year old long-staying schizophrenic female patient was increased by using token economy and social reinforcement. The results in the present study reveal that the application of ABA in psychiatric institutions appears particularly beneficial in the hospital environment. In the present study token economy and social reinforcements were successful with the patient, and expanded use of ABA for a wider variety of behaviors and patients could be an important additional strategy to be systematically applied in psychiatric hospitals for long-staying patients in Pakistan.